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CONTENTS

PAGE

Report on Applications for Matriculation in Schools of Medicine for 1927-1928. *Burton D. Myers* - - - - - 193

An Experiment with the Curriculum. *Lawrence H. Baker* - 200

Twelve Years' Experience of the University of Minnesota in Graduate Medical Education. *Louis B. Wilson* - - 210

Physics and Physicists in Medicine. *Charles Sheard* - - - 220

Medical Education as it Strikes an Anatomist. *H. von W. Schulte* 229

Planning Postgraduate Medicine. *William D. Cutter* - - - - 237

A Method of Teaching Anatomy. *W. S. Sullivan* - - - - - 241

A Practical Roentgenographic Teaching Collection. *George H. Jackson, Jr.* - - - - - - - - - - - - 246

Administrative Personnel of American Medical Schools. *G. Canby Robinson* - - - - - - - - - - - - - 249

Editorials - 263

News Items - 266

Personals - 273

Abstracts - 275

New Books - 286

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BULLETIN
OF THE
Association of American Medical Colleges

Volume 3 JULY, 1928 Number 3

Report on Applications for Matriculation in Schools of Medicine for 1927-1928*

BURTON D. MYERS
Dean at Bloomington, Indiana University
School of Medicine

The following report covers returns from 80 of the 88 medical schools in North America.

More colleges cooperated this year than did a year ago, and the returns of each school are more complete and more reliable. This has made possible the preparation of a report that cross-checks.

In order to make possible a comparison of this report with that of last year, essential elements of last year's report are here repeated.

	1926-1927	1927-1928
Number of applications	20,093	23,590
Number of applicants	8,500	11,282
Number of applicants accepted	6,420	6,495
Number of applicants refused	3,586	4,519
Number of applicants disposition undesignated		268

It will be noted that the total number of applications was 17.5 per cent greater this school year than it was a year ago. The number of applicants was 32 per cent greater than it was a year ago. The number of students accepted is but slightly greater than a year ago. But when we remember that of the 6,420 students accepted in 1926-1927, only 5,019 enrolled, 1,400 being duplicate acceptances, and when we consider that enrollment this year was nearly 1,000 in excess of last year, we conclude that enrollments this year much more nearly approximated acceptances, due, no doubt, to the fact that schools require a non-returnable deposit on acceptance.

Approximately 1,000 more students were refused this year than in 1926-1927.

A copy of the report card sent to all schools is here presented as a key to the detailed tabulated report of schools which follows. It has been necessary to add an "unclassified" column in the report for those applications considered bona fide by the schools reporting, but which administrative officers were unable to classify.

*This report was made at the Thirty-eighth Annual Meeting of the Association held in Montreal, October 24-26, 1927.

Applicants for Freshman Medical Matriculation 1928-1929

School of Medicine .....
(name)

Name of Applicant.....

Address of Applicant .....

I. Credentials satisfactory (quantitatively)
1. Accepted, matriculating for first time.
2. Accepted, repeating freshman year.
3. Refused because class full.
4. Refused because of personality or poor scholarship.

II. Credentials examined and found inadequate (quantitatively)
1. To meet requirement of THIS school.
2. To meet minimum requirements of A.A.M.C.

III. Credentials not seen or examined. Unofficial statements indicate
1. Probably satisfactory (quantitatively) to meet minimum requirements of A.A.M.C.
2. Probably not satisfactory to meet minimum requirements of A.A.M.C.

NOTE—The above makes no provision for record of inquiries, requests for catalog, blanks, etc., from merely prospective applicants.

TABLE 1

Report of the Eighty Schools Cooperating

SCHOOL	I. 1	2	3	4	II. 1	2	III. 1	2	Unclass.	Total
Alabama	51	...	4	81	52	...	13	4	1	206
Albany	41	...	31	13	14	...	10	2	93	204
Alberta	14	...	11	...	2	...	...	1	...	28
Arkansas	29	8	8	30	29	6	...	5	14	129
Baylor	103	9	11	7	2	...	...	...	3	135
Bellevue	202	2	125	210	76	2	27	...	...	644
Boston	57	2	155	273	7	3	32	1	59	589
Buffalo	85	1	124	98	11	...	355	5	...	679
California	60	...	8	50	24	...	...	...	24	166
Chicago U.	114	1	68	30	2	...	...	...	27	242
Chicago Med.	56	9	...	...	11	...	3	2	...	81
Cincinnati	80	4	36	39	26	...	...	...	...	185
Colorado	68	2	26	4	18	...	...	...	39	157
Columbia	162	1	145	86	159	...	...	...	28	581
Cornell	49	...	187	57	29	...	25	4	39	390
Creighton	61	...	61	21	9	...	5	15	14	186
Dalhousie	46	3	11	1	62	...	1	1	...	125
Dartmouth	27	4	7	52	7	19	1	9	...	126
Detroit	95	...	39	11	21	...	15	1	...	182
Emory	55	3	7	96	8	4	1	2	20	196
Geo. Washington	81	2	104	30	20	7	...	...	7	251
Georgia	29	5	95	...	5	...	...	...	2	136
Hahnemann	115	12	258	...	...	...	...	2	1	388
Harvard	125	...	123	127	11	3	79	...	...	468
Howard	66	1	48	...	21	...	16	4	...	156
Illinois	154	9	55	3	13	...	...	...	23	257
Indiana	112	2	32	120	34	...	29	129	...	458
Iowa	160	6	62	3	20	3	5	...	16	275
Jefferson	235	...	117	207	359	...	...	...	18	936
Johns Hopkins	50	...	69	98	3	1	...	...	...	221
Kansas	85	...	98	36	1	8	13	...	2	243
Long Island	221	9	79	381	6	...	24	5	65	790
Louisville	120	1	155	24	8	...	...	...	...	308

TABLE 1—Continued

SCHOOL	I. 1	2	3	4	II. 1	2	III. 1	2	Unclass.	Total
Loyola	128	10	46	67	1	...	...	...	16	268
Marquette	127	...	45	43	...	...	...	...	...	215
Maryland	148	16	214	183	1	13	38	2	89	704
McGill	131	...	90	88	52	10	64	6	1	442
Med. Evang.	113	11	44	...	12	...	13	...	...	193
Michigan	245	...	174	8	277	...	...	26	...	730
Minnesota	100	1	1	12	131	...	...	36	6	287
Mississippi	33	...	7	28	24	4	26	11	...	133
Missouri	51	1	3	39	5	15	...	2	...	116
Montreal	42	3	...	...	...	...	...	...	...	45
Meharry	58	8	61	...	24	...	...	...	...	151
Nebraska	81	5	106	17	18	7	4	...	44	282
N. Y. Homeo.	110	...	246	...	...	...	...	...	16	372
N. Carolina	45	...	16	24	15	5	1	...	12	118
N. Dakota	29	...	15	...	5	3	...	...	7	62
Northwestern	117	6	274	314	46	2	26	9	188	982
Ohio State	100	...	1	24	8	7	...	...	34	174
Oklahoma	54	2	20	41	14	...	8	5	...	144
Oregon	70	...	35	4	14	2	...	...	1	126
Pennsylvania	110	1	425	30	97	43	61	46	23	836
Pittsburgh	78	1	159	3	...	2	6	...	1	250
Rochester	28	...	5	147	...	...	1	...	12	193
S. Dakota	28	...	10	26	6	1	...	...	1	72
S. Carolina	37	5	90	18	6	39	74	24	3	296
Stanford	60	...	8	25	10	...	...	1	...	104
St. Louis	250	28	91	169	25	37	...	4	...	604
Syracuse	48	3	218	51	10	1	2	...	8	341
Temple U.	63	1	1	179	7	21	15	15	86	388
Tennessee	130	1	180	58	20	1	...	...	...	390
Texas	93	5	50	1	7	...	...	...	2	158
Toronto	113	14	11	1	27	...	...	...	2	168
Tufts	208	1	35	403	...	28	66	1	28	770
Tulane	161	2	133	73	331	...	...	...	...	700
Utah	31	...	33	7	13	...	19	...	1	104
Vanderbilt	83	...	...	84	34	10	...	...	...	211
Vermont	39	...	33	3	2	2	142	17	13	251
Virginia	70	1	63	93	7	8	28	5	...	275
Med. Col. Va.	120	4	107	65	...	17	...	...	...	313
Washington	86	6	11	101	17	12	27	3	...	263
West. Ont.	42	1	10	4	4	...	...	...	...	61
West. Reserve	94	2	23	145	43	...	70	3	8	388
West. Va.	62	...	105	...	3	...	...	...	7	177
Women's Med.	42	1	...	3	22	...	7	1	2	78
Wisconsin	116	6	36	...	38	...	2	...	...	198
Yale	53	5	5	274	1	...	1	1	66	406
Laval	2	...	...	...	...	...	6	1	2	11
Georgetown	134	6	32	55	61	18	153	1	20	480
TOTALS	7171	253	5634	5095	2508	362	1560	418	1147*	24148

Total number of cards received 24,148
Duplicates 558

Total number of cards (applications) on record for 1927-1928 23,590

*The 1,147 listed in the unclassified column include incomplete and unclassified applications, and withdrawals. All but 268 of these 1,147 were classified by other schools, making them appear in the final summary as accepted or refused.

Turning to Table 2, below the dotted line are 138 applicants who applied to from 10 to 27 schools and finally were accepted. These 138 men applied 1,848 times, an average of 14.1 times per student, and were accepted by 40 medical schools as follows:

1 school accepted twenty.
1 school accepted seventeen.
1 school accepted fifteen.
1 school accepted thirteen.
2 schools accepted eleven each.
4 schools accepted seven each.
3 schools accepted five each.
3 schools accepted four each.
5 schools accepted three each.
6 schools accepted two each.
13 schools accepted one each.

TABLE 2
Summary of Acceptances

Number Applicants	Times Applied	Total Applications
4090	1	4090
968	2	1936
525	3	1575
277	4	1108
196	5	980
115	6	690
85	7	595
49	8	392
52	9	468
33	10	330
29	11	319
14	12	168
13	13	169
15	14	210
5	15	75
4	16	64
5	17	85
5	18	90
3	19	57
1	20	20
1	21	21
3	22	66
1	23	23
3	24	72
1	25	25
2	27	54
6,495		13,682

TABLE 3
Summary of Refusals

Number Applicants	Times Applied	Total Applications
3038	1	3038
592	2	1184
254	3	762
174	4	696
103	5	515
83	6	498
70	7	490
40	8	320
32	9	288
15	10	150
22	11	242
25	12	300
13	13	169
14	14	196
16	15	240
11	16	176
3	17	51
6	18	108
1	19	19
1	21	21
1	23	23
2	27	54
2	29	58
1	37	37
4,519		9,635

Total number of applicants accepted..... 6,495
Total number of applicants refused..... 4,519
Total number of applicants whose applications were unclassified..... 268

Total number of applicants.....11,282

Total number of applications filed by the 6,495 accepted.....13,682
Total number of applications filed by the 4,519 refused..... 9,635
Total number of applications filed by the 268 not classified by any school..... 273

Total number of applications filed.....23,590

It is obvious that the majority of these 138 were accepted by six schools. Schools wishing to know how many, if any of these 138, were reported by them as accepted, will be furnished the information on application.

Report on Applicants Refused in 1926-1927

Letters were sent to about 3,000 of the students refused last year asking (*a*) if they had finally succeeded in securing admission to some school, (*b*) if they had given up the idea of studying medicine, or (*c*) if they had entered a college of liberal arts to complete preparation for matriculation in 1927-1928.

Replies were received from 812; 256 stated that they secured admission to some school; 379 stated that they had not given up the idea of studying medicine but were attending schools of liberal arts, the better to qualify for medical matriculation in 1927-1928; 81 had given up the study of medicine.

Checking the 11,282 applicants of this year with the list of those refused in 1926-1927, we find that of the 3,586 refused last year, 1,339 reapplied this year. Of these 750 were accepted and 589 were again refused. Of the 750 accepted, 341 were accepted by a school that refused them admission in 1926-1927, while 409 were accepted by schools to which they had not applied in 1926-1927. Of these 750 accepted, 164 applied just once and were accepted by a school that refused them a year ago. Evidently, a year ago there were quantitative or qualitative deficiencies which were made up during 1926-1927 in a college of arts and sciences. Of these 750 accepted, 32 had applied from 5 to 11 times a year ago.

Of those refused 5 times or more a year ago, 43 applied up to 19 times this year and were again refused.

As a whole, we may say, that the really bad students were again refused,—very few, 32, winning entrance this year. For the greater part of those of this group accepted this year had applied but few times a year ago. A further fact of interest is that 168 men who were accepted a year ago were refused on applying this year.

An analysis of these 1,339 applications is on file in my office showing each by name, the number of times he applied this year, the name of the school accepting him, and whether or not he had applied to this school in 1926-1927. This element of the report is too bulky for publication.

Conclusion

In concluding this report I wish to thank the administrative officers of medical schools for their collaboration, and solicit their cooperation for the coming, third and final year.

May I observe that the schools of medicine of America occupy a position that is unique,—unprecedented. No other school of any uni-

versity is forced by applications to greatly exceeding school capacity, to select so discriminatingly the membership of its class.

The enrollment of 120 freshmen with the expectation of having 100 sophomores the following year, dropping 20 students whose year has cost an average of $700.00 per student, a loss of $14,000.00, is not economically justifiable if we can get our 100 sophomores by a more discriminating selection of 110 or fewer freshmen at a saving of $7000.00 or more of school budget, the salary of a full time staff man.

But do we know how to select superior men? Psychologists tell us that psychological tests furnish only contributory, not conclusive, evidence of ability. Recommendations, anyone can and does get. The personal interview, though very important, is again only one factor in the selection. The transcript of record shows only what the student has done under a certain environment and stimulus. If the record is poor, it does not necessarily indicate lack of ability, but possibly only lack of application.

But has the student the spiritual resources available that will enable him to apply himself to his work for the longer hours necessary for the higher quality accomplishment?

In a study by Mark A. May[1], based on 450 Liberal Arts freshmen, he develops a formula for estimating within 3 hours plus or minus, the amount of time necessary for a student of a measured intelligence to earn a desired number of honor points; or the number of honor points a student of measured intelligence may expect to earn by studying a given number of hours per week.

This is the formula:

Time= (.45 x honor points)—(.326 x intelligence) + 50. Let us say that a student with an intelligence rating of 140, carrying 15 hours work, desires to earn 15 honor points, and wishes to know within 3 hours the number of hours per week he must devote to study. (.45 x 15)—.326 x 140) + 50 = 6.75 — 45.64 + 50 = 11.1 hours per week. Let us apply this formula to students of different intelligence and state in tabular form the number of hours per week necessary to earn 15, 30, or 45 honor points, the equivalent of grades C, B, or A.

TABLE 4

Intelligence	Honor Points 15	30	45
140	11.1	17.8	24.5 Hours per week
130	14.4	21.1	27.8 " " "
120	17.6	24.4	31.1 " " "
110	20.9	27.6	34.4 " " "
100	24.1	30.9	37.6 " " "

In Table 4, intelligence 100, is taken as the normal. We presume there are no intelligence 90 men in our schools of medicine. This

1. Mark A. May, Syracuse University, Predicting Academic Success. Jour. Ed. Psychology. Vol. 14, p. 429.

table is believed to be accurate to plus or minus 3 hours, or plus or minus 3 honor points.

Too much reliance must not be placed on it since so many variables are involved. It is, however, helpful to know that it takes about 60 per cent more time to do B than to do C work, and about 110 per cent more time to do A work than to do C work. An examination of the table brings this point out very clearly. Also, it emphasizes the more than double time necessary for an intelligence 100 man to win 15 honor points, than for an intelligence 140 man to earn 15 honor points.

Administrative officers of medical schools have not only an opportunity but a duty to study the problem of selecting superior students. Their experience may be of great value to other schools of our universities.

If we are making progress in the more careful selection of freshmen matriculates, the evidence should be found in a decreased mortality among freshmen medical students, a higher percentage of promotions from freshmen year to sophomore year. While I have made no wide statistical study of this matter, the experience of schools expressed to me verbally indicates that exactly this evidence is at hand.

This is of major importance for the two year medical schools; for as the percentage of promotions increases, acceptances of students by advanced standing must decrease.

An Experiment with the Curriculum*

LAWRENCE H. BAKER
Executive Secretary Johns Hopkins University Medical School

As the result of several years of study on the part of a small committee and various members of the faculty, the Advisory Board of the Medical Faculty of the Johns Hopkins University last year made provision for revising the curriculum of the School of Medicine. For the guidance of those to whom would fall the actual work of revision, the Board marked out certain general policies.

These included (1) that the whole plan of instruction should be so changed as to bring about the utmost liberalization of the student's required work; (2) that the required courses should approximate 2,600 hours; (3) that the existing system of examination should be greatly modified; (4) that the greatest amount of flexibility should be provided so that students might migrate to other institutions or discontinue their regular medical studies at any time or devote a period to special studies; (5) that the degree of Doctor of Medicine should be granted to students who complete satisfactorily a four-year curriculum arranged on a skeletal basis and comprising the major departments of instruction.

Plan of Instruction

In accordance with these principles, the Committee on the Curriculum has framed the plan of instruction which now is in operation. This plan is, at present, still an experiment, and resembles every other experiment in that it is testing out certain ideas by utilizing the material at hand. In this instance, the material consists of the facilities of the School of Medicine, which, like every other school of medicine, is not developed to an even and uniform degree of strength in all its departments. Many of its departments are admirably staffed and equipped to give instruction of a high order. Others, while they offer the fundamental requirements for medical instruction, are admittedly in need of strengthening. It was the aim of the Committee, therefore, to plan the experiment so that conditions local to our own school might be met, that the policies agreed on by the Advisory Board might be put into operation, and that the student, while being grounded in the essentials of all major subjects, might be given the opportunity to utilize the stronger departments to the fullest extent.

During the year 1926-1927, the Johns Hopkins University School of Medicine ran on a schedule of 33 weeks, divided on a trimestrial basis. The entire year could be regarded as presenting 5,148 possible instructional hours. Of this amount of instructional time, 3,558 hours were required for prescribed subjects; and 1,590 hours were left to be

*Read at the Thirty-eighth Annual Meeting of the Association held in Montreal, Oct. 24-26, 1927.

employed according to the student's discretion. Every student went through virtually the same regimen, regardless of his tastes or aptitudes, and only the more brilliant, or more daring succeeded in deviating even slightly.

New Curriculum

The new curriculum provides for 32 weeks of instruction and one week of examination. Instruction is given through four quarters of approximately eight weeks each. This year, the first quarter extends from October 4 to November 30; the second, from December 1 to February 4; the third, from February 6 to March 31; the fourth, from April 2 to May 31. The total amount of the students' time utilized for required subjects is 2,635 hours; the rest of his time is free. A comparative statement of the required hours this year and last is as follows:

	Originally (Based on 33 weeks)		Now (Based on 32 weeks)	
First Year				
Anatomy	374		264	
Physiology	44	(275)	160	
Histology-Neurology	220		168	
Physiological Chemistry	165		144	
Bacteriology	121		88	
Pharmacology	....	(88)	56	
Psychobiology	11		16	(896)
Free time	352		360	
	1287		1256	
Second Year				
Pathology	363		288	
Normal Physical Diagnosis	66		64	
Abnormal Physical Diagnosis	33		64	
Clinical Microscopy	66		96	
Diagnostic Methods	....		32	
Physiology	231		0	
Pharmacology	88		0	
Surgery	33		0	
Laryngology	4		0	
Psychiatry (Medical Psychology)	22		8	
Medicine	66		0	(552)
Free time	315		704	
	1287		1256	
Third Year				
Obstetrics	115		92	
Medicine (including Pediatrics)	368		256	
Surgery	241		144	
Gynecology	49		16	
Neurology	81		40	
Ophthalmology	16		12	
Hygiene	11		12	
Psychiatry	16		40	
Medical Zoology	11		8	(620)
Free time	379		616	
	1287		1236	

Fourth Year			
Medicine	439	312	
Surgery	264	192	
Surgical Pathology	0	16	
Ophthalmology	50	48	(568)
Free time	544	680	
	1287	1248	
Total Required Hours		2,636	
Total Free Time		2,360	
Total		4,996	

The skeletal plan of instruction was sought not only for the entire curriculum, but for the individual subjects as well. To a large degree this was obtained; but nowhere was a cut made ruthlessly on a flat percentage basis. In fact, physical diagnosis in the new curriculum is at approximately the same level as before, if one takes into consideration the addition of the course in diagnostic methods, which embraces ophthalmoscopy, otoscopy, laryngoscopy, neurological examinations, roentgen ray and general surgical examinations. The curriculum designates the major subjects of medical education, the whole scheme of instruction being made to center about clinical medicine. These major subjects of the four years are anatomy (including histology and neurology) physiology, physiological chemistry, pharmacology, pathology, (including bacteriology), medicine, surgery, obstetrics, phychiatry, pediatrics, ophthalmology.

Departmental Cooperation

The several departments concerned in arranging the curriculum have been extremely cooperative. They have been quick to recognize the impossibility of doing a completely thorough job in any one subject unless unlimited time is allowed. Modern facilities and enthusiasm for scientific research have increased the fund of knowledge pertaining to medicine so that it is impossible for the student to absorb everything about all the departments in a four-year period of training. The departments have endeavored, therefore, to reduce their instruction in the required subjects to a skeletal form, giving the student an introduction to the essentials and the necessary guidance that he might add thereto for himself. In the main, they have confined themselves to the principal avenues of their subjects and have insisted on required time for a specialty only where the specialty has called for familiarity with a technic peculiar to it, as, for example, in gynecology, or nose and throat work. The instruction in each major department stresses the requisite principles and makes no attempt to be encyclopedic in character.

Mass versus Individual Instruction

In general, the first two years of the course may be divided from the last two years by the fact that in the former the tendency is for

the classes to move as units, whereas in the latter the movement is more in accordance with the election of the individual. In the first year, all instruction, except in pharmacology, is for the whole class. In the fourth quarter of that year, one half of the class will have laboratory exercises in pharmacology on Tuesday, and the other half, on Thursday. The remainder of the time is free for elective work. In the second year, again, all instruction is for the whole class, with the exception of physical diagnosis. Three groups, each comprising one-third of the class, will each study physical diagnosis for two days a week and will have the remaining four days for free elective work.

In the third year, the instruction increases the use of small groups, and only a minimal number of hours is set down for the whole class. Required courses in obstetrics, gynecology, ophthalmology, medical zoology and hygiene occupy a small portion of the year. The three main divisions of medical instruction in this year are medicine, surgery and neurology-psychiatry, in each of which, courses of instructions are given during each quarter of the year. The student may elect his quarter. Utilizing small groups again, the fourth year proceeds in a similar manner. The student is required, however, to take only one quarter of work in medicine and one in surgery. These two major courses are given in each of the quarters, although a limit is necessarily imposed upon the number of students who may be accommodated.

Free Time

The free time may be observed readily to be more abundant in the last two years than in the first two. The value has been recognized of consecutive free time as against a mass of sporadic unoccupied hours. Effort was made by the Committee, therefore, to concentrate the free time as much as possible. A fair amount of time is free in the first two years; but the greatest success has attended this effort in the third year, when an entire quarter is free, and in the fourth year, when an entire half of the year is free.

No effort is made to guarantee the elective courses freedom from conflict with each other or with the required work. It is felt that such a policy will inject a valuable element of competition into the program, and will make it possible for the demands and needs of the students to enforce upon the instructional staff conditions which should be conducive to raising, rather than lowering, the quality of presentation.

A suggestive schedule, representing what one portion of the entire class, should they so elect, may use as a working guide, was published in the BULLETIN, October, 1927, pp. 343 and 344.

Responsibility for adequate and wise employment of his free time rests wholly with the student. The School of Medicine, through its committees supervising instruction and examination, will consider eligi-

ble for the degree of Doctor of Medicine only those students who have completed successfully the minimal curriculum of required work and who can, in addition, demonstrate an intelligent use of their free time. The greatest amount of liberty is to be allowed in the interpretation of what constitutes intelligent use. The student may devote his free time to additional work in a required subject. He may, if properly qualified, work at a problem in research under the direction of a faculty member. In his quarters free from required work, the student may even elect to go to another institution; and it is hoped many will make such election.

Responsibility of Student

Although the student carries considerably more responsibility than he did previously for the rounding of his elementary medical education, he also finds more opportunity to pursue lines in which he is especially interested, and is not compelled to do exactly what his fellow student does. In his choice of work and in the mapping of his schedule, he is afforded guidance whenever necessary. The planning of an elective quarter in another institution may be discussed with the Assistant Dean, whose consent is necessary before the student may embark on work outside. It is also the intention of the Committee on the Curriculum that permission be obtained from the responsible officers in the departments concerned in work to be pursued elsewhere by the student.

One of the most conspicuous opportunities which the new curriculum offers the student is to be found in the facility with which, under it, he may construct a program of study emphasizing a subject in which he discovers that he possesses ability and interest. By way of example, it may be assumed that a given student finds reason to want to emphasize in his training some particular branch of surgery. Under the previous schedule, unless he was very much above the average, and developed time and energy to devote to extra laboratory work and reading in this branch, the student's opportunities for such emphasis were somewhat limited. Under the new schedule, it is quite possible for him to devote his free time to this interest and to progress virtually as far as his industry and intelligence permit.

Departmental Program

Such a course in the School of Medicine is now being referred to as a "departmental program." The subjects of study which the student pursues in such a program will be determined largely by the head of the department to which the student wishes to devote himself. In the example used above, the student would apply to the professor of surgery, who would outline broadly a course of study to be pursued for the development of a surgical career.

The academic value of the "departmental program" is regarded as one of the strongest points in favor of the new curriculum. Not only

does it provide opportunity for the student to acquire the basic train- from that of his classmates and to develop his special talents. The ing requisite for work as a physician, but it also provides the time and advantages of such a program are, perhaps, more evident in the preclinical subjects, but they are not to be underestimated in the clinical. In both, they will save the student time in development, and will allow him to accomplish in his student period much of the specialistic broadening which now must be reserved for the years after graduation.

The successful operation of the new curriculum demands that the students who work under it be of a high type. To meet this demand, it is intended that the present method of selecting students in the School of Medicine be continued and that the number of mediocre or poor students be kept as low as possible. The present limitation of enrollment is to be maintained at 300 students, and the maximum to be admitted in any one year is to be kept at seventy-five.

Accomplishment versus Time

Inasmuch as the licensure laws of the several states speak of medical registration in terms of years, a time qualification cannot be eliminated entirely—at least not for the present. Nevertheless, it is hoped that eventually the student's program will be marked by work accomplished, rather than by the mere passing of years. So far as concerns our school, however, the system of examining which has been adopted with the new curriculum will do much to divide the students on a work basis rather than a time basis. Commencing this year, group examinations will be given in the required subjects of instruction. Students may appear for the examinations in the preclinical subjects at the end of the second year of registration, or at any set time thereafter. The only condition to be observed in this connection is that before being admitted to the major courses of clinical instruction, the student is required to have absolved the examinations set in the preclinical subjects. The examinations will be of a comprehensive and general nature, rather than of the detailed type previously given at the end of each major course of instruction.

"Passed" or "Failed"

The official record of the student's examinations will show only whether he has passed or failed. The entries "passed" or "failed" will be kept in the administrative office on the student's record card, and there will be added thereto the notes of the action of the committee on instruction as to whether the student's use of free time has been satisfactory or not. Inasmuch as a little more detailed information concerning the student's work may be needed in instances of recommendation for interships or other openings, it is assumed that the several departments may keep records to supplement the central ones. Such supplementary records, however, are not absolutely necessary, as the

groups of students handled at any one time will be small enough to permit close observation by their instructors and ready evaluation of their merits.

The fitness of the student will not be determined entirely by the results of his examination, but also by the judgment of his several instructors regarding his capabilities.

Working It Out

Perhaps one of the best ways to illustrate the manner in which the new curriculum works would be to follow a student through it. He is able to vary his itinerary considerably, so that a few conjectural routes may be pursued to demonstrate the possibilities. For the first route, let us assume that the student is not especially venturesome, and is content to follow the suggested schedule printed in the catalogue. Except for getting the permission of the instructors concerned to follow an adequate number of elective courses, his period of training is apt to be easy to observe. He may, however, become interested in pathology, whereupon he secures the help of the professor of pathology for the formation of a "departmental program," which may present a second route. If he decides that, to develop his interests in this program, he must go to another institution, or even abroad, he may utilize an elective quarter for this. It may be that he goes abroad in the summer, at the close of the second year, and decides to remain away for the first quarter of the third year. This is quite feasible despite the seeming obstacle of obstetrics. He simply has to arrange his schedule for the fourth year to allow time for this subject. It would be possible, also, for him to leave during the middle of the fourth year, and come back at the end of the final quarter to face his examinations. Another possibility might be for him to remain away a whole year or more and come back in any quarter he happened to strike, although such an arrangement does not guarantee his obtaining his degree in four years. The possible routes are many and devious, but all are open. Many of them are being followed already with a spirit of adventure and enthusiasm which makes us feel that the results of the experiment will not be entirely negative.

Flexibility of Curriculum

The new curriculum appears to be one of the most liberal and flexible types ever adopted by an American school of medicine. Many worthwhile principles, therefore, may be established by it, should the experiment prove successful. The ideas behind it have been suggested time and again in the past few years, not only at Johns Hopkins, but by students of medical education from all over the country. Some of them were expressed last year, in the meeting of this Association in Cleveland. In the new curriculum, we believe that we have done much to meet the frequently expressed desire for an adjustment between

the broad medical training of medical practitioners and the type of graduate instruction which has been successful in American institutions for the development of independent investigators.

Although we regard the new curriculum as a very definite step forward, some few years will be needed to prove accurately its true value. Despite the fact that the curriculum presents a very different plan from that on which instruction was organized last year, very few difficulties incidental to the change have been presented this fall by either instructors or students. The new has supplanted the old with an ease that argues favorably for the outcome of the experiment. The most valid results of the test of the new plan can come only after at least one class has been carried through it. That will be several years from now; but the working of the plan at present, under mixed conditions—some students having begun their medical work under it, others having to adjust themselves to it—leaves little apprehension concerning the outcome.

Discussion

Dr. George M. Kober, Georgetown University School of Medicine, Washington, D. C.: I hope the new curriculum has eliminated the necessity of dropping some of the junior students at the close of the third year on the grounds that they are good students, very well prepared, but not quite of an order to enter their senior year. I have declined to receive students of that type from Johns Hopkins, though the applications were accompanied by a fervent plea on the part of some of the professors, and I hope that the new method will tend to eliminate what seems to me almost a cruel practice.

Dr. Wilburt C. Davison, Duke University, Durham, N. C.: I should like to emphasize some of the points which Dr. Baker has made. After the curriculum committee with the cooperation of the heads of the various departments had made the skeleton curriculum just described, it was necessary to offer a larger number of elective courses. The students can take these organized elective courses or do independent work. The required work in Physiology and Pharmacology, which was formerly in the second year, has been transferred to the first in order to give the students a more varied curriculum early in their course and thus enable them to choose electives from a wider range of subjects. They can either obtain a minimum of training in each branch or specialty with the intention of going into general practice, and there should be a larger number every year, for the specialties are becoming crowded and the opportunities in general practice increasing, or they can concentrate in one or another department if they intend to enter a specialty. The former group can advantageously study the analysis of the average work of a medical practitioner, which Dr. Baker has presented, in order to prepare themselves for the problems which they will encounter while the latter group can ask the head of the department in which they are interested to outline a "departmental program" to fit them for their chosen field. The spending of one or more quarters at another medical school either in this country or abroad is valuable and this migration is encouraged.

There is no compulsory supervision during the free time and these are no examinations at the end of each course. After all, one of the chief fuuctions for which the course examinations were designed, namely, to eliminate the student who should not have been admitted, has now apparently been made

unnecessary, or at any rate less essential, by the present method of selection of students. Under this plan the annual percentage of failures has been reduced from over fifteen per cent to less than two. However, in order that the public and the school may be protected from inadequately trained graduates the group examinations in the preclinical subjects at the end of the second year and in the clinical subjects at the end of the fourth year will be comprehensive and demand a more complete knowledge of medicine than can be obtained from the required courses in the schedule. In other words, the reduction in the amount of time in the required instruction does not mean that additional study is unnecessary. The choice of this work, however, rests with the student rather than with the faculty, but he must demonstrate that he has utilized his free time profitably. The former numerical system of grading has been abandoned and only the record of "passed" and "failed" will be used.

It is hoped that these comprehensive or group examinations in all of the preclinical and all of the clinical subjects will give a student an entirely new point of view and that, instead of completing long required courses which he usually assumes were designed by the faculty to give him all that he should know about each subject, he will realize that his short required courses have merely been a foundation upon which he must build if he expects to pass his examinations. He must commence in his free time the process of self-education, which is so necessary to success in medicine. Another advantage of comprehensive examinations is that they enable a student to learn the relationships of the various branches of medicine to each other. He must bring his knowledge of Anatomy, Physiology, Pathology, etc., to the same point at the end of his second year rather than, as is usual at present, to learn Anatomy, pass his course examination and then forget while studying Physiology that Anatomy has any relationship to it. Comprehensive examinations will probably unlock the "water-tight" compartments of the various branches of medicine and increase their correlation. It is probably true that the faculty will find in these comprehensive examinations that a student will not know as many details as he formerly did in his course examinations, given immediately after the completion of his study of the individual subjects but, after all, the essential feature of any medical examination should be to ascertain the fitness of the student to practice medicine rather than to test his success in completing any one particular course. In medicine, for instance, if a student understands the basic methods of taking histories and of examining patients and can logically collect and analyze the information he has gained so that he can make a correct diagnosis and institute proper treatment, he probably will be a better physician than one who can enumerate a detailed list of diseases with their symptoms.

I should like to emphasize, as Dr. Baker has done, that this plan for liberalizing the curriculum is merely an experiment made in the hope that by allowing the student more freedom in planning his course a better trained graduate may be produced.

Dr. Lawrence H. Baker: I do not feel that the new plan in itself will eliminate the dropping of students at that time. We have a mechanism for catching up students at the end of any year and deciding whether they are equipped sufficiently to go on with the next year's work. However, we do feel that the system of selecting students and testing them more carefully in their first year's work is working out more and more satisfactorily each year, so that such eliminations as are necessary may eventually be restricted to probably the early years.

Dr. Wilburt C. Davison, Duke University, Durham, N. C.: Dr. Myers has emphasized that one of our difficulties is multiple applications to medical schools. At the Johns Hopkins Medical School, we decided that we might

meet this situation and also help the students as well as ourselves by notifying applicants of their admission or rejection as early as possible during their senior year at college. To do this we had to adopt more definite standards, so the medical school records of all of our students were examined in order to determine whether there was any correlation between the impression formed of a student at the time of his admission, and his record in the school. For several years all applications had been classified as A, B and C; for example, an application from a well recommended student from a creditable college would be graded as A; a B applicant might be from a creditable college with a mediocre recommendation, or with a good recommendation from a college of lower standards; and a C student might be one who had had a poor record but whose instructors believed was capable of better work in a medical school. Our classes consisted approximately of 70 per cent A men, and 20 per cent B men, and 10 per cent C men. It was found that 7 per cent of the A applicants had failed, 22 per cent of the B students and 66 per cent of the C men, so it was decided in 1924 that although the classes might not be filled to capacity, only Grade A candidates would be admitted. In order to obtain more information in regard to the applicants, a personal interview with the Assistant Dean or one of the regional representatives was required. During the three years in which this plan has been in force the failures have been less than 2 per cent and the number of grade A candidates has doubled so that the incoming class is usually filled by April.

Dr. Myers has suggested that it might be difficult for students from two-year medical schools to gain admission to the third year class of four-year schools if all of them were able to reduce the number of failures. However, in addition to the vacancies caused by scholastic failures, a number of students in the medical schools of this country withdraw voluntarily for financial, health and other reasons, and as a result the students from the two-year schools can be accommodated.

Twelve Years' Experience of the University of Minnesota in Graduate Medical Education*

LOUIS B. WILSON
Director of the Mayo Foundation
Rochester, Minnesota

Historical

For several years prior to 1915, the University of Minnesota, in common with other universities, had been offering graduate work in the basic medical sciences. In 1914, it began graduate work in various fields of clinical medicine and surgery.

At the Mayo Clinic at Rochester, Minnesota, the training of medical graduates for special work in pathology, clinical medicine and surgery, by means of internships, residencies and assistantships in connection with research work in the laboratories, had been developed, until in 1912 regular three year courses were in operation.

On June 9, 1915, the University of Minnesota and the Mayo Foundation for Medical Education and Research, through the leadership of Mr. George H. Vincent, then president of the University of Minnesota, and Dr. W. J. Mayo of the Mayo Clinic, entered into an agreement by the terms of which the funds and income of the Mayo Foundation should be devoted, under the direction of the Board of Regents of the University of Minnesota, to the promotion of graduate medical education and research. After a year and a quarter trial period, the funds and income of the Mayo Foundation were, in September 1917, transferred entirely to the Regents of the University. Thus, the Mayo Foundation became an integral part of the University of Minnesota, controlled entirely by that body. At the same time, the Mayo Clinic entered into an agreement with the University of Minnesota whereby it agreed to furnish to the University the free use, for teaching and research, of all its clinical material, laboratories, museums, library, and such offices as might be needed by the Mayo Foundation. On this basis, for more than twelve years, the University of Minnesota has conducted graduate work in medical education and research in the Mayo Foundation at Rochester, as well as in its medical school in Minneapolis.

Organization

The entire graduate work in medicine at the University of Minnesota is made a part of the general Graduate School. Its entire management is vested by the Board of Regents in a Committee consisting of: the President of the University, the Dean of the Graduate School, the Dean of the Medical School, the Director of the Mayo Foundation, four appointed members of the Faculty from the Medical School, and four appointed members of the Faculty from the Mayo Foundation.

*Presented at a meeting of the New York Academy of Medicine, January 19, 1928.

This Board is divided into a Medical School Section and a Mayo Foundation Section, each of which holds frequent stated meetings and has a large degree of autonomy in its own affairs. Quarterly meetings of the entire Board are held, when all the work of each section, since the preceding meeting, is reviewed, and all general policies affecting both sections of the school are discussed and recommendations thereon made to the President of the University.

Resources

Financial.—Graduate work in the Medical School at the University is supported out of the general budget of the University principally by grants made biennially by the state legislature. The graduate and research work in the Mayo Foundation is supported by the income from the Mayo Foundation Fund of somewhat over $2,000,000, and in addition, since 1919, by the income from the Endowment Fund of the Mayo Clinic, which fund now somewhat exceeds $8,000,000. The budget of the Mayo Foundation for the year ending June 30, 1927, was slightly over $467,000.

Scientific.—The scientific resources of graduate medical work at the Graduate School consist of all those educational facilities, used, in part, by the undergraduate medical students,[1] and those at Rochester of facilities previously mentioned which are provided gratis by the Mayo Clinic. It should be noted, however, that besides the hospitals, clinical examining rooms, library, and museum, there are now about 150 rooms used for laboratories at Rochester, and of the staff of 132 physicians, physicists and chemists, eighteen are engaged wholly in research work and twenty-two in part-time laboratory research work. Most of the others are devoting a considerable portion of their time to clinical research. All the staff are on a "full-time" basis.

Methods

Since the beginning of the graduate work in medicine at the University of Minnesota, no attempt has been made to multiply opportunities for securing simply technical training through practitioner's courses.[2] Graduate work has been definitely planned to provide opportunities in from three to five years of work for the well prepared, serious minded student to fit himself in the science as well as in the art of some special field, as in a basic medical science, or in clinical medicine or clinical surgery.

Graduate students have been selected on the basis of their superior qualifications from a very large number of nominally qualified applicants. Thus, during the past year, there were more than 1,200 ap-

1. The relations of the graduate work done in the Medical School to the resources and functions of the Medical School were discussed by Dean E. P. Lyon.
2. The University through its Extension Department gives "Short Courses for General Practitioners" and through the Mayo Foundation "Clinical Weeks" in special fields, but these do not lead to graduate credit or "certificate" and are wholly unrelated to the graduate work under discussion here.

plicants for fellowships in the Mayo Foundation, and of these less than 100 were accepted. There are at present about seventy men and women doing graduate work in medicine at the Medical School in Minneapolis and 287 in the Mayo Foundation.

In the Mayo Foundation there are no classes. There are during the year three lectures a week by members of the Faculty, and an average of one lecture a week by some eminent authority outside the Faculty. Attendance at all these lectures is purely voluntary. Those given by the members of the Faculty are confined largely to a discussion of the newer advances in the various fields of medicine. Those given by extramural lecturers are of two types: first, a series each year on some topic of general interest in scientific fields nearly related to medicine, as heredity, nutrition, or plant pathology. The second group consists usually of unrelated lectures determined by the selection of eminent men who can be induced to talk on topics of their greatest personal interest. A course begun last year, and which will continue for the next five years, consists of six lectures a year on special topics in the history of medicine.

These 200 lectures constitute almost everything in the nature of didactic teaching which is done in the Mayo Foundation. But the graduate students are working in close association with the members of the Faculty. The groups average a few more than two graduate students to one member of the Faculty. Their daily work, whether in research, routine laboratory, or routine clinical departments, is thus under the immediate personal supervision of staff members.

Perhaps the most important instruction aside from this daily supervision is done in the seminars which are held in some sections every day and in most departments at least once a week. It should be noted, however, that these seminars are very informal and the students' opinions are expressed as freely as are those of the members of the Faculty. As a whole, the seminars are most enthusiastic affairs.

Appointments

The minimal length of appointment is for three years; the maximum is five years; the average length of residence is four years. The only exceptions to the minimal three year period of residencies are made to accommodate fellows, or members of teaching staffs of other universities or foundations, or of government services who are accepted for periods of six months or more.

Student Support

In the Medical School most graduate students receive living stipends from appointments as teaching fellows in their major or minor fields; a few pay their own tuition and living expenses. In the Mayo Foundation all graduate students, except those from other universities, are on Foundation stipends. Fellows in the basic medical sciences receive

stipends of $900, $1,200 and $1,500 a year, the first, second and third years, respectively. Fellows majoring in clinical fields receive $800, $900 and $1,000 for the first, second and third years, respectively. Fellows in clinical research receive the stipend of fellows in basic sciences while they are engaged in research and the stipend of fellows in clinical fields while engaged in clinical work. In addition to the above, most fellows receive appointments as first assistants either in their third or fourth years which give them $1,000 a year in addition to their regular stipend. A single man can live comfortably in Rochester on the minimum stipend paid in any field.

Courses of Study

While in the University Bulletin there is given a formidable list of detailed "courses," these are really only integral units for purposes of registration and evaluation of graduate credits. The student is requested to indicate before his acceptance only his major and minor fields of study. He is expected to put in a minimum of two years in his major field and a minimum of six months in his minor field. His minor field must be a basic medical science and lend support to his major, which latter may be another basic science or a special clinical field.

For his first quarter's residence, unless he has indicated some other preference to the contrary, the fellow works in his minor field or in some nonclinical coordinate department. Before the end of his first quarter, he is usually sufficiently oriented so that he is able to select intelligently his residence for the several succeeding quarters of his first three years.

The unit of residence in most departments is six months, though in a few it is three months, and in first assistantships it is one year. Each man is very conscientiously graded each quarter by the chief of the department in which he is studying. These grades furnish a guide to the Director of the Foundation in preparing the quarterly schedules of personnel and are the fundamental basis for determining priority in conflicting requests for the same service. As a result of their use, each quarterly change of schedule, which concerns about one-half of the graduate men, provides from 75 to 80 per cent of the graduate students with their choice of work; 10 or 15 per cent with their second choice, and the remaining 5 or 10 per cent take work for which they did not ask but which is always in the line of their major field.

Advanced Degrees

The following are the minimum requirements for recommendation to the Board of Regents for the degree of Master of Science with field named, as Master of Science in Pathology or Master of Science in Surgery:

1. A minimum residence of two years in medical sciences, or three years in clinical fields.

2. No quarterly grade below B in the major field or below C in the minor field. Quarterly work graded below these points cannot be counted for residence.

3. The certification of all the members of the Faculty with whom the student has worked that in their opinion he is competent to do good teaching or research in his major field, if that major is a fundamental medical science, or that he is competent to begin practice in a scientific manner without supervision in his major field, if that major field is a clinical specialty.

4. The successful passing of a series of routine examinations in his major and minor fields. These examinations are designed to be, if possible, a little more difficult than those given in the same fields by any state board or by the National Board of Medical Examiners.

5. The unanimous approval of his thesis by a committee of five members of the Faculty. This thesis must embody the results of his personal study. It is not necessarily an elaborate piece of original research.

6. His recommendation by a jury, usually of eight or ten members of the Faculty, who review the record of his entire work in the university and give him a two-hour oral examination in the fields of his major and minor subjects. If the candidate is successful in his examination, he is recommended by this jury to the Board of Regents to receive the degree of Master of Science in his major field.

7. For the degree of Doctor of Philosophy, with field named, all the requirements used previously for the Master of Science must be met and in addition the candidate must have had a minimum of three years of residence, have passed thorough examinations in French and German, and have submitted a thesis which embodies, as the result of his own research, a substantial contribution to the science of his major field.

In other words, the attempt has been made to insure the granting of the Master of Science degree only to those students who appear competent to do good teaching or research or thoroughly dependable clinical work in some special clinical field. The Doctor of Philosophy is reserved for those who in addition give evidence of decided ability in research.

Summary of Registrations

Starting with an attendance of 79 graduate students in 1915, the number has gradually increased until at present there are 357 graduate students. The average number of graduate residents each year for the last five years ending June 30, 1927, was 297. Of these the average number in basic sciences was 65, distributed as follows: Anatomy, 18;

physiology or physiological chemistry, 18; bacteriology, 13; pathology, 13; pharmacology, 3. The average number in internal medicine and clinical medical specialties was 104, distributed as follows: Internal medicine, 63; pediatrics, 13; dermatology, 7; obstetrics, 6; neurology, 5; preventive medicine, 5; roentgenology, 5. The average number in residence in surgery and surgical specialties was 128, distributed as follows: General surgery, 97; ophthalmology, 10; otolaryngology, 10; urology, 7; orthopedics, 4.

So far as one can observe the trend over so short a period as gaged not only by the number of graduate students accepted, which is determined in large measure by the facilities available, but also by considering the relative number of applications in the several branches, it may be stated that while there is no falling off in the number of applicants for fellowships in surgery, there is a very great increase in the number applying for work in internal medicine and medical specialties. At the same time, there is a slight increase in those seeking opportunities to major in the fundamental medical sciences, especially pathology, anatomy and physiology.

Applications

Of the 1,200 applicants each year for fellowships in the Mayo Foundation, about 90 are taken on service. Of the ones who are accepted, their average age at graduation from medical school is a little under 25 years, that is, about two years less than the average age at graduation of all graduates from Class A medical schools. This shows a tendency to the selection of younger men. No one more than 35 years of age is accepted and seldom anyone over 30. The average age at taking up residence in the Mayo Foundation is a little over 27, an average of about two years and four months having elapsed between the date of graduation from medical school and the date of beginning work in the Mayo Foundation.

Previous Preparation

About one-third of the fellows have completed four years of college work before beginning the study of medicine. All of the others have had two or three years of college work leading, in some instances, to the attainment of the Bachelor's degree during their subsequent medical course. All have graduated from American Class A schools or those of equal standing in foreign countries. The largest number from any one school are from the University of Minnesota and the next from the University of Pennsylvania, with the Universities of Chicago, Michigan, Johns Hopkins, Northwestern, Toronto, Harvard, Virginia and Iowa, closely following, in the order named. About 10 per cent are from foreign universities, not including in these men from Canada. At present, there are sixty-two universities represented by the students now enrolled.

After graduation from medical school, the average of two years and four months training before coming to the Mayo Foundation has been spent as follows: an average of fifteen months in hospital residence, three months of additional laboratory service, and ten months in general practice.

Civil State

About one-third of the fellows are married before taking up residence in the Mayo Foundation. About one-sixth of the fellows get married while in residence. Thus one-half of them are married before leaving. Married men cannot support their families on fellowship stipends unless they receive first assistantships (unsually near the end of their third year) and thus additional stipends.

Period of Residence

During the first twelve years of the Mayo Foundation's experience as a part of the University, beginning in 1915, about 10 per cent of the fellows have left during or at the end of their first year. About one-half of these have left by request of the Faculty, the remainder of their own volition, usually because of financial or family reasons. Of those who have remained beyond the probation period, the average period of residence during the twelve years has been thirty-three months for fellows majoring in preclinical branches, thirty-seven months for those majoring in internal medicine and related medical specialties, and forty-one and one-half months for those majoring in surgery and surgical specialties. This, of course, covers the period of the Great War and of readjustment thereafter. The average residence period at present, that is during the last five years, is approximately four years for all groups.

Work while in the Foundation

1. *Preclinical Fields.*—The fellows majoring in preclinical fields, physiology, pathology, and so forth, have averaged 27.3 months full-time experience in laboratory work in their major field and 5 months full-time experience in laboratory work in their minor or related preclinical fields.

2. *Clinical Fields—Medicine.*—The fellows majoring in internal medicine and the related branches have averaged 29 months full-time experience in their own major clinical fields and a little over 8 months full-time experience in their minor or other clinical or related fields. In their major field about two-thirds of their time has been spent in diagnostic work and about one-third in hospital residence. In the diagnostic service they average about four new cases a day. This seems to be a very small number but it must be remembered that practically all the cases seen are complicated, otherwise they would not have been referred to the Mayo Clinic by their home physicians. The hospital residence in most instances has been specialized, that is, the fellow for

a certain period has had the care of only one type of case, as renal, thyroid, cardiac, and so forth. Of the fellows majoring in internal medicine and related branches about one-half took their minor work in pathologic anatomy, about one-fourth in physiology and physiological chemistry, and the remaining ones in bacteriology, serology, and so forth. Many fellows after a quarter or two in their minor (preclinical field) have carried on their studies in this field for several years coincident with their clinical work. Much the larger number of theses require study wholly or partially within the minor field. There is a strong tendency toward increasing the time spent in research in the basic medical fields.

3. *Surgery.*—Of the fellows majoring in surgery and surgical specialties the average service of forty-two months was divided into an average of six months of full-time laboratory service in their minor field, (in most instances in pathology,) one year in diagnostic work, and two years of operative work. During about three-fourths of the latter two years they were resident in the hospital. Fellows majoring in surgery have shown the tendency to relate the whole or major part of their thesis material to their minor field, though in most instances it has had also a definite clinical bearing.

Publications

Each graduate student who is a candidate for an advanced degree must present a thesis. This is not necessarily published. Indeed many of them are published only in title, and most of them in abstract or abridgment. There are, however, about sixty papers a year which are published complete or in abridgment by fellows of the Foundation.

Degrees

From 1915 to the end of 1927, the University of Minnesota has granted for work done under the auspices of the Graduate School but in the Medical School at the University and in the Mayo Foundation, a total of 282 advanced degrees. Of these 239 were Masters of Science (with field named in the case of all candidates previously holding the M.D. degree), and forty-three were doctorates in philosophy. Of these 282 advanced degrees, 111 were in the basic medical sciences distributed as follows: 37 in anatomy; 29 in physiology; 22 in pathology; 18 in bacteriology; 5 in pharmacy. Fifty-six were in medicine and the medical specialties. Of these, 21 were in internal medicine; 10 in neurology; 8 in obstetrics; 8 in pediatrics; 4 in dermatology; 3 in preventive medicine; 2 in roentgenology. There were 115 in surgery and surgical specialties. Of these, 87 were in general surgery; 11 in urology; 9 in ophthalmology; 4 in otolaryngology; 4 in orthopedics.

It should be noted that a very considerable number of graduate students who have fully completed their residence requirements in the university but who have had to leave before the completion of their

theses or other formal requirements are still eligible for their advanced degrees, and it its expected that a fair proportion of them will yet successfully complete their requirements and be recommended for the degrees which they seek.

The relatively small number of men out of the total number of eligible candidates who have completed all the requirements for the degrees in the fields of internal medicine and related medical specialties, is accounted for by the fact that there is so large a demand for properly trained men in these fields that many graduate students have been tempted to leave before they have completed their graduate study or thesis work. Many of these are technically on leave and hope at sometime to return and fulfill the requirements for their degrees.

Despite these two explanations, it must be recognized, however, that even in the face of the very careful initial selection of personnel there is a considerable percentage of graduate men who are unable to meet the requirements for an advanced degree. If I were asked to name the chief reasons for failure of these groups, I should say it was largely because of two factors: (1) inadequate training in medical school in the basic medical sciences, particularly physiology and pathology, and (2) lack of personal initiative.

While there is no obvious pressure brought on students by the Faculty to force them into high speed of work, yet it is true that the men themselves set a very rapid pace, and a man who is capable of doing only average work very soon finds himself so far in the rear that he is apt to give up. Such a one, of course, receives much personal attention from his chief, but it is not the policy of the Graduate School to coddle weaklings and they are advised to go into other fields in which their slow gait may not be so obvious an impediment to their success.

Distribution of Alumni

Nearly 500 graduate students who have been one year or more in residence have left the two sections of the department of graduate medicine in the University. These are ordinarily referred to as alumni, though only 282 advanced degrees have been granted. About 70 per cent of all the alumni are now in whole or part-time teaching or research positions in universities. A few who majored in preclinical sciences are now in charge of laboratories in large hospitals without teaching affiliations. About 80 per cent of all those who are engaged in consultation practice either whole or part-time are in group clinics, or other partnerships. Slightly less than 20 per cent are in consultation practice alone. So far as I have been able to determine, only thirteen individuals have gone into general practice. These for the most part are men who left the Foundation after only a relatively short time of residence, their average period of residence in the Foundation

being sixteen months. Of those holding academic rank, about one-half are still instructors, one-third assistant professors, and one-sixth associate professors or professors. There is one Dean of a medical school. In extenuation I may add that he is also professor of surgery in the same institution.

While no accurate facts are at hand or indeed possible, one gathers the impression, even on a very conservative basis, from talking with the alumni, a large percentage of whom return for their annual reunion, that the period of "arrival" of men in clinical fields after leaving the University is from five to seven years. By date of "arrival" I mean that time at which a consultant is obtaining as much clinical work as he can carefully do. When we remember that these men have begun their graduate work at an average age of slightly over 27 years, have left at an average of 31 years, their age of "arrival" would appear to be from 36 to 38 years. This, I believe, to be a very favorable showing in comparison with that of able men who have "arrived" by various other methods of training. So far as I can determine, men in medical and surgical specialties in the country at large "arrive" at about 40 years of age. But, of course, there is a very great variation in different parts of the country and with different men in this regard.

Summary

The University of Minnesota, in an experiment lasting twelve years, has organized its laboratory, research and clinical facilities to give opportunity to young medical graduates of superior ability who have had about two years' experience since graduation in a hospital, laboratory, or in general practice, to fit themselves during an average period of four years for teaching or research in a basic medical science or for teaching, research and practice in a special clinical field of medicine. The work has in no way interfered with the progress of the undergraduate medical school. On the contrary, it has very greatly stimulated the ambition and character of the work of the undergraduate students. The organization of the work as a part of the general Graduate School of the University, instead of a part of the Medical School, it is believed, has been a very decided factor in the development of high standards and appropriate methods in a field where previous university experience was almost entirely absent.

The product judged by the character of the research of the graduate students, their teaching ability, and by their skill and success in clinical fields, is very much more satisfactory than had been hoped for. There is every reason to believe from present indications that this product in the future will be greatly improved in all the particulars named. It is to be hoped that many other universities may see their way clear as a few are now seeing it to develop similar graduate medical work, for which there is a very large legitimate demand.

Physics and Physicists in Medicine

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One morning last spring I found on my desk two letters from men in two of our leading New England institutions of learning. One was from a professor of biophysics telling me about the possibilities of the establishment of courses and research work in biophysics in two of our midwestern universities. The other was from a graduate student in physics who evidently had a desire to depart from the beaten paths of classical physics and to apply his training in physics, mathematics, chemistry and the like, to problems involving the molecules, atoms and electrons of which our bodies are composed.

This young man asked several pertinent questions, such as: What would a physicist do in the fields of medicine and biologic sciences? What kind of training, in addition to fundamental physics, mathematics and chemistry, should he obtain? Does The Mayo Foundation offer graduate courses in biophysics? What other institutions give courses or afford opportunities for research in biophysics? What opportunities are there for a continuation of these interests after graduation? Then, with a smile and then a hearty laugh, I read: Just what is biophysics anyway? I answered the young physicist (who is halfway through the prescribed course leading to the degree of Ph. D.) as honestly and as candidly as I knew how, and used the substance of the distinguished professor's letter to indicate the probable future and importance of that which we shall call biophysics, because it has been so named. In answer to his question: Just what is biophysics anyway? I felt like saying: What you make of it.

What is Biophysics?

If, in answering this question, we should jot down one slant of mind we should parry and ask: What is biology? What is physics? What is physiology? For, as one[1] of greater fame than comes to most mortals said: "All the sciences are linked together and must advance in concert. The human body is a chemical and physical problem and these sciences must advance before we can conquor disease." And again, a distinguished biologist[2] was asked to deliver an address on the occasion of the dedication of a new physics building at one of our leading institutions of learning for women and commenced his address by remarking: "It comes to me as a surprise that a biologist should be invited to give an address at the dedication of a physical laboratory.

1. Rowland, H. A.
2. Morgan, Thomas H.: The relation of biology to physics. *Science*, 1927, lxv, 213-221. Delivered at the dedication of the new physical laboratory at Vassar College, October, 1926.

. . . First of all, I should like to point out that one of the most important developments in recent times is the recognition of the need in biologic sciences of workers trained in physics. It seems to me that the reverse is also true, that a biologist is needed in physical laboratories." He goes on to say: "A modern physiologic laboratory is scarcely to be distinguished from a physical laboratory, having borrowed its instruments, at least, from the former."

In 1926, therefore, it was perfectly proper that a biologist should deliver himself on a foundation devoted to physics for the reason that the modern electronic concepts of matter and the quantum theory of energy, for example, are just as essential to the biologist and the physiologist as to the physicist. The only difference lies in the points of application and the emphasis. Let us take a specific problem and ask: How is sugar used by the body? While we do not know the answer, we still have many leads. Sugar is a substance made up of molecules composed of lifeless (in the ordinary conception) atoms of carbon, hydrogen and oxygen. But when the sugar was formed and stored by the plant world, energy was absorbed. When sugar is used by the body, this absorbed energy is given back.

Questions relative to energy and its measurements are relegated usually to the field of physics. But the chemist steps in and gives us a long list of probable intermediate compounds existing between sugar as such and the product finally assimilated by the body. Then the physical chemist or biochemist draws nigh with his methods and measurements of oxidation and reduction, and looks at the problem both physically and chemically. Then comes the physiologist who is interested chiefly in the functional phases and so is concerned with the question of sugar in the blood, the storage of glycogen, muscle glycogen, the part that insulin plays in the metabolism of sugar, and so to the end, that he may learn what the normal and diseased body does with sugar. So in this as in every other problem, it is the slant of mind and viewpoint that constitute the field of scientific endeavor.

But the physiologist, so called according to the old-time definition, cannot get along without chemistry, physics and mathematics in the present day and age. He may, perchance, if he is a superman, get along without the chemist, the physicist and the mathematician, but the frontiers of science have been so extended into No Man's Land of knowledge that the all-sufficiency of such a man as Helmholtz is impossible. It would appear, therefore, to be logical to train the physiologist or biologist fundamentally in physiology, biology and germane subjects with a sufficient amount of training in physics and mathematics to acquaint him with points of contact which other so-called branches of science may make with his own specialty or, again, to afford him such a working knowledge of these subjects as to enable him to apply the essential principles to his own work. The physical chemist

or biochemist should, in turn, be trained chiefly in inorganic, organic, physical and colloidal chemistry with an acquaintance with the fundamentals of physics, mathematics, biology and physiology. It is not necessary to outline the fundamental training of the biophysicist, for the only difference in the training of the biochemist, the physiologist, the biologist and the biophysicist lies in the point of emphasis. Biophysics, then, has been defined possibly without actually wording the definition. It is simply the application of the laws and principles of physics to biologic problems.

The Necessity of Cooperative Research

Whether, then, experimental physicists, mathematicians and mathematical physicists are willing or desirous of leaving their sphere of action, acquired by the right of eminent domain, to tunnel through and endeavor to join forces with those who occupy other heights of knowledge is somewhat beside the question. The fact is that they must do this or else aid in the training of those who will. The practical point at issue is that, Biblically stated, the hand cannot say to the foot, "I have not need of thee." If the fundamental sciences of medicine are to advance and make of medicine more of a science (without, we hope, in any wise detracting from it as an art), there must be closer cooperation among and more frequent groupings of physiologists, chemists and physicists. There must be more frequent marriages between the sciences if there is to be a progeny of sufficient variety to tackle the myriad of unknowns, which will, in all probability, multiply in the future much more rapidly than will the laborers capable of undertaking their solutions. In many respects these unions of sciences and scientific workers will be like the union of husband and wife, for each will preserve its identity and self but each will contribute to the solidity and permanence of the family. So, I think of the biophysicist as one who, working side by side with the mathematician, the biologist, the chemist, the physiologist and the practitioner of medicine, will contribute individually and jointly to those things in which he is expert to the end that science as applied to life may become more accurate, with less hypothesizing, less guessing, and less error because of failure to coordinate the findings obtained from the broader approach provided by the correlation of sister sciences and fellow workers.

What can Physics and the Physicists do in Medicine and Biology?

I feel that the expression of opinion of one who stands sufficiently afar to get a true perspective will be of greater worth and of more probable soundness than statements from those of us who are actually engaged in biophysical teaching and research. I am prone, therefore, to quote in full several paragraphs from a recent paper by Dean Guy

Stanton Ford on "The University Graduate Medical School and Medical Science."[3] He writes:

"The discussion of present day physics is the discussion of a subject new not alone to medical research, but in many of the aspects new to physicists themselves. From the static condition of a few years ago when even physicists themselves regarded their field as worked out, physics has become in the last decade again a dynamic and bountifully rewarding field of investigation. In a little more than a decade it has forced the frontiers of biology and chemistry and struggles with them for preeminence in solving the problems of the very beginnings of life in the cell itself. The man who questions whether physics has a place in medical education and research may, if one is charitable, be set down as a person who studied the physics of a quarter of a century ago and has had the misfortune to remember it to the exclusion of learning anything of physics as it is today.

"The discovery of the roentgen ray and radium and the development of the electronic theory of matter are the fundamental advances that have transformed physics. They have done two other things: they have revolutionized the attitude of the physicist toward biology and of the biologist toward physics. Two sciences which once looked on each other with uncomprehending and suspicious eyes are now able and cooperating servitors in the most advanced medical research laboratories.

"Through physiology or physicophysiologists, the teachings of physics and of physical chemistry, which is rooted equally in physics, became part of the technic in the attack on medico-biologic problems. With the applications of the roentgen ray, the discovery of radium and the development of radiology and even the more recent work in ultraviolet light, physics leaped at once to the very center of interest in matters vital to therapy. It was a demonstration of the importance of a basic science so complete that it made converts even of the surgeon, in itself no mean achievement. The question remains, however, whether we have followed through to effective conclusions in medical research and education the full consequences of what is implied in this new status of physics. There are certain encouraging signs that we are on the way even if the physicist is too often left to force his way in, rather than being welcomed and given his full status as a contributor to medical science.

"In seeking illustrations of the service of physics, I leave to one side the influence it has exerted and is exerting as a science which replaces empiricism with exact measurement and the application of physicomathematical methods and laws. I can do this more readily because there is in Arrhenius's little book on The Quantitative Laws of Biological Chemistry a striking demonstration of the application of the mathematical laws of the velocity of reactions to digestion, resorption, immunization and similar topics. Neither shall I dwell on the work done by physicists in devising and building apparatus. In testimony of this, many a physics department can point to the gaps in its ranks caused by the loss of able colleagues who have been drawn off by manufacturers of instruments of precision. The electro-cardiograph is a daily testimonial of the application, by Steinmetz and other physicists in cooperation with clinicians, of the vacuum tubes and amplifiers of the radio receiver to better ways of getting data about the body and its functions in the form of oscilliographs.

"For what I have in mind more pertinent illustrations lie at hand. There are few in this group who are not more familiar than I am with the contributions in the field of radium and roentgen ray by men essentially trained in physics, such as Duane at Harvard, Stenstrom[4] in the State Institution for

3. Ford, Guy Stanton: The university graduate medical school and medical science. *Proceedings, Congress on Medical Education,* Chicago, Feb. 15-18, 1926.
4. Now at the University of Minnesota as associate professor of physiology.

Malignant Disease at Buffalo, Clark in the Rockefeller Institute, Fiahle in the Memorial Hospital, New York City, Weatherwax in the General Hospital, Philadelphia, Kegerreis[5] now at Michigan and Sheard[6] of the University of Minnesota, or The Mayo Foundation at Rochester. Ultraviolet microscopy in the study of cancer tissue has been given a great impetus even if the solution is not yet found by the work of Barnard who is fundamentally a physicist. In spectroscopy, the work of Gibbs of the Physics Department of Cornell who has been applying ultraviolet absorption to the study of chemical-pharmacological problems, of the physicists and clinicians at Minnesota basing their efforts on the work of Hess and his associates in investigating the effects of ultraviolet radiation on cholesterol through a study of changes in its ultraviolet spectrum, are not only achievements but they are even more significant as indications of possibilities in medical research. The work of Professor Bovie[7] at Harvard on ultraradiation with special reference to its effects on protoplasm and single cell structure gives real meaning to the term biophysics. In the field of bacteriology I can offer the testimony of our own department at Minnesota resulting from the appointment of a man with an engineering degree and a sound training in physics. It was an extraordinary thing to do, but it has been fruitful.

"To anyone who has marked the sterility during the last few decades of the clinical contributions to the field of the special senses, there is new hope in the work of the physicists such as Southall at Columbia, Sheard of The Mayo Foundation, and Allen at the University of Manitoba. When last year I was administratively interested in a promising experiment in the tactile and visual interpretation of speech, I could not but be impressed with the extent to which the work of the phychologist in charge was dependent on the work of the physicists, Fletcher and Crandall and their staff, in the experimental laboratories of the Bell Telephone Company. If there is hope for renewed progress in the fields, it apparently lies along the lines opened up by physics and psychology. When this is more generally recognized, let us say in ophthalmology, for example, there will be an end to the penny-in-the-slot prescription for training ophthalmologists by giving them refractions and more refractions supported chiefly by anatomy and pathology of the eye.[8]

"As one seeks to sum up the possibilities of physics as a fundamental contributor to medical science, he can understand even if he does not accept the view of the distinguished anatomist who in discussing this topic of the biological attack on the problems of life and death said: 'Chemistry and physics are both involved but largely from the side of biological chemistry and biophysics. Biophysics in the end will probably prove more really important to the understanding of life processes than will biochemistry, since physics in a way underlies chemistry.'"

What Should be the Fundamental Training

Dean Ford's comments and a variety of similar comments that might be written regarding the contributions of men who were trained primarily as physicists, afford ample proof of the statement that physi-

5. Now a student in medicine at the University of Chicago.
6. Has done nothing in the field of radium and roentgen rays. Chief interests are in general field of effects of radiant energy upon plant and animal life and growth.
7. Now in charge of the work in biophysics in Northwestern University Medical School.
8. The work of psychologists in the field of the special senses is well known. Reference to recent work would name Gault of Northwestern University, the Professors Ferree at Bryn Mawr, Ames at Dartmouth in physiologic optics, and Professor Frank Allen, professor of physics, University of Manitoba, whose studies in taste, touch and smell, have given noteworthy applications of physical-mathematical methods and laws in this neglected field.

cists who have turned their attention to applying their science to medical and biologic problems have made valuable contributions even in the face of probable lack of early or possibly inadequate training in the biologic, physiologic and medical sciences. It does not follow, of course, that physicists would have made more numerous or more valuable contributions had they been trained as biophysicists. If young men and women are afforded opportunities for acquiring, early in their college careers, such fundamental courses as are given in physics, mathematics, chemistry, physiology, biology and psychology, and then pursue advanced undergraduate and graduate work in some or all of these sciences, then a safer, more proficient and better rounded out teacher or research worker will be added to the ranks of those who are chiefly interested in solving the problems that have to do with life. I have had many conversations with noted medical practitioners, educators and research men regarding the fundamentals of a training in biophysics. In schemative form, the essential training, probably partially undergraduate and partially graduate, is, it seems to me, about as follows:

Biology.—At least a thorough year's work.

Physiology.—At least a year's course.

Chemistry.—(1) General. (2) Qualitative and quantitative analysis. (3) Organic. (4) Physical: (*a*) Theoretic; (*b*) laboratory.

Mathematics.—(1) Trigonometry and college algebra. (2) Analytical geometry. (3) Calculus: (*a*) Differential; (*b*) integral. (4) Differential equations. (5) Mathematics especially applied to problems of physics and chemistry.

Philosophy.—(1) Logic. (2) Philosophy and history of science.

Psychology.—(1) General. (2) Experimental.

Physics.—(1) General. (2) Advanced theoretic courses in (*a*) electricity; (*b*) light and (*c*) sound. (3) Advanced laboratory courses in (*a*) electricity; (*b*) light and (*c*) sound. (4) Roentgen rays and radioactivity. (5) Modern electronic theory.

This schedule presents titles which, I believe, will be understood generally and need no further explanation. Nothing other than scientific subjects is listed. Obviously, German and scientific German, French and scientific French, English and English literature and like linguistic training must be provided. And again, I have not listed a foundation course in anatomy or bacteriology. Perhaps, they should or must be included.

Biophysicist of the Future

Furthermore, it is a question in my mind whether or not the biophysicist of the future should not be taken a little closer into the fold of medicine, which has suffered in the past from its zeal in blocking anything that departed from the teachings of the fathers, and given a course, possibly definitely prepared to meet his needs, regarding the

essentials of physical diagnosis and of laboratory and clinical tests. This would be highly desirable as an advanced-stage graduate course. It would (1) acquaint the embryo biophysicist with the practical problems of everyday medicine; (2) enable him to become acquainted with the nomenclature and parlance of medicine and surgery; (3) lead him to think of ways and means of applying his knowledge to assisting the practitioner of medicine in getting his data more accurately or more quickly, and (4) give him an appreciation of the clinician's habits of thought, thereby enabling him the more readily to join in experimental and clinical research. For, in the last analysis, the biophysicist should have a triple viewpoint: (1) independent research in carrying on that which would not be carried on by others who are not trained as he is; (2) joint researches with those working in the pure sciences of physiology, biology, and the like, and (3) joint researches with the clinician who deals with the sick. Such a viewpoint and such a program will enable him, as the great French ophthalmologist, Landolt, once said to me, "to keep his feet on the ground and his head in the skies."

No one person may ever become all that has been stated, but some, dependent on desires and talents, must serve the science of medicine and public health in each of these threefold points of contact. Above all, the biophysicist who becomes allied with the field of medicine must never forget that the practice of medicine and surgery is the endeavor to heal the sick and to succor the physically and mentally weak. So he must set himself the task of bringing home to the busy practitioner, out of the maze of his cogitations and experimentation, the practical applications of his science. And yet, if he can, he must keep himself afar on many occasions so that he may bring in new ideas and ideals which, perchance, may not bear fruit for many years to come. And he will be a lucky person, indeed, if he contributes one really permanent principle.

Both extremes must be avoided in the training of a biophysicist. He must not have a single-track mind, neither must he be a jack-of-all-trades. To be sure, certain types of single-track minds, when fitted into proper surroundings and when properly coordinated with others of broader viewpoints, do produce much of value. But the probable tendency in these days is for everyone in either the sciences or the professions to become a specialist amongst specialists and to "know more and more about less and less," as it has been stated so tritely. Perhaps the greatest need today is for those who can so philosophize, generalize and correlate the separate parts as to bring them into one composite whole or, figuratively speaking, to fit the arms, legs and head to the main torso. It would seem logical, therefore, to train the would-be biophysicist in the fundamental principles of the basic sciences and mathematics, to permit him to take up some general broad field of research and to hope that he will develop the ability, as he grows older

and becomes more widely acquainted with the applications of his science, to supervise a variety of interests undertaken as discrete problems by a group of younger men or research workers. The universities and foundations for medical education and research must avoid, therefore, the Scylla and Charybdis of believing that a biophysicist is (or should be) a Simon-pure radiologist or spectroscopist or what-not to the exclusion of all else; or, again, that they can train and turn from their doors in three or four years of graduate work one who is an expert radiologist, physiologist, biologist, physicist, mathematician and so on, ad infinitum. The middle ground, here as elsewhere in life, is probably the safer ground, at least as a general principle.

A Biophysics Program

In concluding this paper I am venturing to put on record some account of that which is being attempted in biophysics at the Mayo Clinic and under The Mayo Foundation of the Graduate School of Medicine of the University of Minnesota. Two or three years ago fellowships were established in the fundamental or basic sciences. These fellowships permit the holders to pursue, both at The Mayo Foundation and at the University, courses of instruction and research work leading to the degrees of Master of Arts and Doctor of Philosophy. So far as biophysics is concerned, there is a group of fellows, both men and women, of medical and nonmedical training, who are carrying on researches the results of which are to be submitted (or have been submitted) for the degree of Master of Arts or Doctor of Philosophy.

The variety of topics under investigation is considerable. From the standpoint of the physicist, they involve spectrophotometry (visible, infra-red and ultraviolet), ultraviolet microscopy, measurements on stimuli and responses in vision, audition and allied fields, oxidation and reduction potentials, measurements of radiant energy, and so forth. The training of those who are fellows in this field has been varied: some have come largely through the avenues of physics and mathematics, some through physical chemistry, some through physiology and some through medicine. To a certain extent, therefore, each case must be considered by itself and the requisite training in germane subjects in which the candidate is deficient must be supplied here or elsewhere.

To illustrate, I am taking the case of a man who has a master's degree and has recently completed the necessary courses covering the first two years of graduate work in physics and mathematics and has passed his oral and written preliminary examinations for the doctorate based on these subjects chiefly, with a minimal examination in biology, physiology and chemistry. Before he comes up for his final examinations he must have completed satisfactorily a piece of original work on some problem that falls within the general purview of biophysics, namely, the applications of physical principles and methods to the

solution of some unknown in biology, physiology, radiology or a similar subject. In addition thereto he will not receive a great deal of intensive drilling in those matters in which he has shown reasonable proficiency but rather in those subjects which are germane to his sphere of action and in which he is inadequately trained. A year or more spent in such surroundings, besides attending lectures, seminars, clinics, reading current literature and much of the literature in physiology, biochemistry and certain phases of experimental medicine which have appeared in print during the last few years, quizzes, and assigned readings, ought to round him out sufficiently broadly to enable him successfully to begin teaching or research (or possibly both) in biophysics after graduation. For the field of medicine will have need of such young men and women, since it cannot advance without well-trained teachers and research workers in the basic sciences and in the applied sciences of medicine and surgery. It would seem, therefore, that the field of medicine will be the gainer. If this is so, then there can be no loss to anyone, for the biophysicist, as he becomes more of an integral part of medicine, will also profit by the successes of the great body of those who are concerned with the science of making the unhealthy healthy and of keeping the healthy healthy.

Medical Education as It Strikes an Anatomist*

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The anatomist has a more immediate opportunity than most of his colleagues to appraise the entering class on their first contact with the medical school. To those who can remember conditions when two years of college were not required, the improvement seems great and important, and that in both quality and in training of the students. Many of the unfit have been eliminated and those that have survived the premedical years are able to begin work in the department more effectively. Far less time is lost in a breaking-in process, which used to try the patience of the instructor in the first quarter.

Cordially and thankfully the benefit is acknowledged, but there is still ground to regret that this useful preliminary training has been so time-consuming and that the student is conscious of so marked an increase in the demands upon his energy and application when he passes from college to medical school. It would be more gratifying and hopeful to find him disgruntled at our high school methods than appalled at the amount of work required of him. His regrettable tendency to view all formal education in terms of credits based on courses and hours of instruction, rather than as opportunity to gain knowledge and acquire skill, is a natural consequence of our own confidence in mechanization, our belief in processing rather than developing our students.

Yet the loss of time before beginning medicine is not wholly charged off when we reckon it is one or two years. The detriment is not measured in retardation alone or even in a certain mental slackness but rather in habits of dispersed efforts and miscellaneous activity which engendered in idleness have come to fill the gaps of the curriculum of high school and college. It has been said that the American boy is mentally retarded and socially precocious. In the accepted, if not always admired practice of school and college there is much to explain the result, and we cannot stifle the regret that My Lady Education in escaping the restrictions of the cloister has made her interests coterminous with Vanity Fair. The worst of it is, that no one is especially to blame. It is the free play of the national mind. The promiscuous acceptibility of all things, even incompatibles, was given literary expression by Walt Whitman and is externalized by a whole series of institutions as diverse say as the college and the drug store. Just as it is possible to procure medicine, pharmacopeal or proprietary, from amidst the sundries and notions of the drug

*Read at the Thirty-eighth Annual Meeting of the Association held in Montreal, Oct. 24-26, 1927.

store, so some education may be had at school or college, but it is not always conspicuously displayed and is associated with a gallimaufry of undergraduate trivialities which are tolerated, if not actually encouraged and abetted, because they are believed to foster college spirit.

Youth is not, as a rule, discriminative, and our matriculants come to us with much beside their minimum requirements—with tastes and habits and desires for amusement, display and social organization beyond their years, their leisure and quite often beyond their financial resources, the latter especially since the increasing wealth of medical institutions co-operates with the commodity-index to raise the fees for tuition.

Causes of Failure

In our experience, two causes of failure of first year students rank almost equally with native endowment. The first may be expressed in a delinquent's words "I was too slow to realize I was no longer at college;" the second is gainful occupation outside the curriculum hours, not by any means always, not even most frequently from necessity, but for means of keeping up with the Jones of the students' social world, his fraternity, for example, and its round of entertainments.

An imperfect attitude toward mental work is not the sole obstacle to the happy induction of the student into the discipline of anatomy. Mind set has much to do with performance. The anatomist has cause to deplore that so great a cloud of witnesses attest the dryness of his subject matter. No subject of itself is either interesting or uninteresting. Interest is largely synonymous with effort, and effort depends on personal purposes. It is regrettable that so many who ought to know better make themselves responsible for a silly misprision of the matter. It diminishes the efficiency of the department by engendering a negative attitude on the part of some students, perplexity in the minds of others. Not often does the latter mood come to so naive an expression as in the case of an ardent youngster who exclaimed in a burst of confidence to his instructor, "What a pity anatomy is so dry a subject. I enjoy it more than anything I have yet studied." I am not asking that the anatomist should be immune to criticism, but only that a whispering campaign against his subject should be discountenanced.

Teaching of Anatomy

As regards the teaching of anatomy, much the same things may be said of it as may be said of the teaching in other departments. We are most of us teachers by accident or vicissitude, some probably enough teachers at all adventure. Very few have more than a bowing acquaintance with pedagogy. And in spite of the growing

demand for better teaching, the situation will not improve until a fairly satisfactory career is open to teachers, as teachers, in our medical schools.

By and large we get what we pay for. The premium placed on research has produced some investigators and many publicists: by the same token, a premium on teaching should favor scholarship, produce a moderate supply of teachers and many educators, if the proverb runs true that "those who can't, teach, and those who can't teach are educators." As things are today, only a man of personal means and singular self-abnegation could select teaching in a medical school as a life's work.

In spite of much adverse criticism, there is no question that very general improvement has been effected in medical teaching in the last thirty years, and probably no department has advanced more than that of anatomy. Certainly, no department has accepted so large a reduction of time as anatomy, and such curtailment usually results in improvement of teaching, if for no other reason than because it necessitates a selection of subject matter. It is not evident that our students know less anatomy than when a moiety of two years was devoted to the subject, nor is the criticism of the results obtained appreciably greater now than then.

But this is not intended to imply that the didactic problem of the shortened course has really been solved, or even fairly met, only that the amputation has been survived. Mechanical accessories have increased, dissecting rooms are possible places, better material is available and better use is made of it. But goals are no better defined; purposes are divergent and there is no general agreement as to what the student should be taught and to what subsequent course anatomy owes chief consideration. There is still an impression, historically founded and widely accepted, that anatomy should keep constantly in view the needs of the surgeon.

Surgery versus Anatomy

It is hardly an exaggeration to say that a generation ago the axis of medical education ran through the departments of anatomy and surgery. Today the anatomist might say to the surgeon—"Brother, the center of the stage is no longer ours," and he might add, not to be too brotherly—"You, at any rate, should never have been there." That surgery is dramatic, of wide popular appeal, that the surgeon is a man of action, more aggressive than his medical colleague, are all facts aside from the importance of his subject matter to the undergraduate in medicine, but all have played an important rôle in the shaping of our schools and hospitals. If the purpose of undergraduate education shall prove to be the training of the general practitioner, surgery will suffer some further reduction in the curriculum,

and the demand on anatomy for undue emphasis on operative application will somewhat abate.

From this viewpoint, the medical curriculum might be symbolized by an inverted Y, anatomy and chemistry converging to a synthesis in physiology, the stem of the letter continuing through pathology to diagnosis as the internist understands diagnosis, not of an organ but of a person or even a community, while the various preventive and therapeutic branches might form the foot of the letter. This is very crude, with very important omissions, but it illustrates a shift of interest believed to be the major change the present generation has effected and introduced here to support the claim that anatomy should be viewed as antecedent to physiology and without direct responsibility to surgery.

Regional Anatomy

The special detailed regional anatomy useful in the operating room should be taught in major part by the surgeon to whom it is of importance and largely as a matter of postgraduate special training.

There is, of course, the alternative of a bridging department, perhaps comprising experimental surgery, operative surgery on animals and surgical anatomy. Here is a possible location for the full-time surgeon who might find happiness in creative work as other laboratory workers, on a salary no larger than theirs, as great as he now enjoys astride the margin of active practice with only his conscience for his guide.

Anatomy might thus emerge from servitude to the clinician without retiring to the university as President Wilbur has suggested. Much as his plan has to recommend it from the standpoint of developing the scientific anatomist, and replaceable as anatomy might be in the medical school by such a department as adumbrated above, still it were well to wait until the university has quelled the college in its midst, for it is doubtful that the basic sciences will fare better in an atmosphere dominated by campus interests than they are now among clinicians who are at least serious and medical, if not always scientific.

New Textbook of Anatomy

Returning to the intrinsic problems of the teaching of anatomy the suitability of our so called textbooks may be questioned. They remain of much the same size and general composition as thirty years ago; indeed, they all conform more closely than their publishers and editors seem to realize to their prototype, Gray. They, were, perhaps, though I doubt it, manageable as texts when anatomy spread broadly over the curriculum of the first two years, but with the reduction in hours and more especially in duration of the course, it

may be argued that they are outmoded. If they were proper for a two years course, by the same token they are too large for one year. The inevitable reply to such criticism is that they are books of reference.

Without debating their very modest proportions to foreign works designed for this purpose, such as Bardeleben, Charpy and Poirier or even Quain or Chiarugi, it may, perhaps be worth suggesting that we need a textbook adjusted to the length of our course and giving a norm of its contents. Such a book should be readable and should not run into endless detail. It might take as its motto Cheselton's cheerful pronouncement in the preface of his once popular work.

> "The study of anatomy, as it leads to the knowledge of nature and the art of healing, needs not many tedious descriptions nor minute dissections; what is most worth knowing is soonest learned, and least the subject of disputes; while dividing and describing the parts, more than the knowledge of their uses requires, perplexes the learner and makes the science dry and difficult."

As illustrative of the point made in the last sentence the following may be quoted from a current textbook of repute, of deserved repute. It is the description of the origin of a muscle.

> "From—(1) the lateral half of the distal margin of the popliteal line and the middle third of the posterior surface of the tibia; (2) the medial side of the head and of that part of the body of the fibula next the interosseous membrane in the proximal two-thirds; (3) from the whole of the proximal and the lateral portion of the distal part of the posterior surface of the interosseous membrane; and (4) from the septa between its proximal portion and the long flexor muscles."

The cumulative effect of this type of description when conscientiously applied to every structure in the human body is devastating. To the average student of the first year it comes close to being "chloroform in print."

By way of contrast, I would place in juxtaposition the description of the origin of the same muscle literally translated from a foreign work, also for students.

> "O (rigen)—posterior surface of the Membrana interossea and adjacent borders of the tibia and of the fibula down to their distal fourth, Fascia crurus profunda."

The two statements are comparable as to content, but the synthetic description is more compact and vivid than the analytic. It is further supported by admirable illustrations, which the American writer cannot always command.

The comparison is made to emphasize the obvious fact that a method of recording knowledge tolerable and, perhaps, proper to a work of reference intended for the moderately well informed, is overwhelming in an introductory book for beginners. Were it worth anyone's while to take note of the reaction of first year students, there is little room to doubt that one would find them rebuffed and discouraged by the pedagogically portentious texts supplied them, and in times of stress taking refuge surreptitiously in the compend. The dryness of anatomy emanates from the literature in which it is mummified.

The desuetude of teaching is nowhere more evident than in this item of proper texts for the study of gross anatomy. That this and not the oft proclaimed exhaustion of the subject is the true cause of the condition is evident from other fields and other lands. There is no dearth of new editions of the classics, and surely philology has had time enough to exhaust its field, and there is no lack of new and innovating texts for students in gross anatomy in other countries. In Germany, the veteran Merkel and the admirable Brauer have published during and since the war; in France, Rouviere and also Gerard; in Italy, Anile; of somewhat older vintage are Buchanan in England and Scalabounos in Greece. The important thing is that all of these texts are really texts for students, each is the work of a single author, they severally have internally consistency of view and presentation, and everyone of them is a serious attempt to solve the problem of the beginner. Collectively these works are evidence of ripe scholarship animated by zeal for teaching. We, to offset them, have no important departure from type, except Gerrish, who deserved more appreciation than he received.

In other branches of anatomy, embryology and in neurology, we have produced adequate texts; and we have a very creditable record in histology though we still use some translations in which rather ungraciously the translator has advanced to editor or even co-author on the title page.

This suggests as a partial explanation of the static condition of textbooks of anatomy, the diversion of interest to newer and more productive fields. Few professional anatomists in America are predominantly concerned with gross anatomy. The majority have qualified by research in other branches of the subject. The vivid interest which English and continental anatomists find in adult anatomy and their ripe scholarship are all but lacking in America.

But it may be doubted that the author of even an ideal text for students would meet with rewarding recognition or an assured reception of his work, for we are so sensitized to mass and bulk that

mere adequacy in books or institutions runs the risk of being taken for unabashed inferiority.

Trend of Undergraduate Education

This trend of the American mind makes the suggested program of directing undergraduate education to the training of the general practitioner, however humane, seem something meager for grandiose institutions, which, however, unconsciously are tending to the production of a medical aristocracy, if not actually by creating in the physician a sense of superiority towards the public he is to serve, at least in elevating the costs of education and service above the means of ordinary people who seek these benefits.

Institutions like personalities naturally seek to expand; in a highly individualistic and acquisitive society, with equal naturalness they seek to acquire wealth, a measurable portion of which is inevitably allotted to display. Few ideas are more worthy than those of medicine to be symbolized in noble buildings. Yet each advance in this field of educational activity brings in its train a mounting scale of expense and more importantly an increased tendency to substitute mechanical procedures for personal proficiency.

A problem faces medicine today at the acme of its success. The large and important middle class finds itself embarrassed by the rising costs of medical service, on the one hand, and on the other, a profession which charges itself with responsibility for the nation's health meets that responsibility imperfectly in districts where the financial rewards of practice are small.

The erection of predominant institutions in the larger centers of population, the training of physicians to practice in relation to and with reliance on such institutions, does not meet the whole problem. Rural districts cannot be cared for by poorly trained physicians, but possibly they can be by differently and locally trained practitioners. The inadequate doctor is better off and less of a social menace in the larger center where consultants are available to save him and his patients from his mistakes. In the rural districts, he must carry on largely alone.

To meet rural conditions, decentralization is necessary to the extent of developing at the very least one good medical school in every district, and this presses more as a national health problem than the increase of institutions in the wealthier communities.

For the middle class, relief should probably be sought in some method of spreading the costs. The business man will turn to insurance, the social scientist to state medicine. Neither of these solutions are wholly acceptable to a profession more concerned with service than with reward. If, however, such tendencies are to be rejected, the profession itself must initiate a superior program; mere

obstructiveness will not indefinitely postpone a drastic solution on the part of the public. A system in which the clinician becomes a salaried officer of the community does not in itself fill the laboratory man with horror. He has found life quite tolerable with a modest solution of its financial problems and freedom to devote himself to intellectual and humanitarian interests.

The Four Quarter System

The disadvantages to the medical student have been overemphasized. For example, it is said that he needs the four months of vacation. However, practically all medical students at the present time work during their summer holidays; 50 per cent study preclinical or clinical subjects in some place or other and if this time were spent under supervision at a medical school the character of the work would be improved and much valuable time saved. The 50 per cent who earn money during the summer vacations could probably earn more in the year which they will save under the four-quarter system than in the three periods of four months each. The establishment of loan funds, rather than scholarships, will do much to solve this phase of the problem. It has been said that a medical student cannot physically endure the work of forty-four weeks a year. If so, he probably should enter some less arduous occupation, for as a physician he undoubtedly will have to work as hard or harder for longer than forty-four weeks a year. The total of eight weeks of vacation, which every student will have under the four-quarter system, should be sufficient for any one. The argument that the summer climate of Durham or of any other city would be injurious to medical students would be vigorously answered by weather statistics of chambers of commerce, and also by the realization that the major part of the population remains at work all summer and that practically all the physicians continue their practices. As a matter of fact, if any student prefers to study four calendar years of thirty-three weeks each he can do so under this flexible curriculum. A certain number of students, either through illness or through financial difficulties, will probably be absent one or more quarters, but under this curriculum they can take up their work at the beginning of the next quarter and not lose a whole year as is necessary at present. This irregularity is in itself an advantage, for it will reruce the usual rigid lock-step succession of studies.

The fear has been expressed that if the four-quarter system were adopted it would be necessary to repeat numerous courses in order to accommodate both the students who desire the four-quarter system and those who attend only three quarters, and that a much larger number of teachers and a greater medical school budget would be required so that the staff could have the present academic vacations.

It is probably true that under the rigid curriculums used in most medical schools it would be necessary to repeat several required courses in order to accommodate the students who did not attend the summer quarters. However, if the present schedule of the Johns Hopkins University School of Medicine, which has many advantages, were adapted to the four quarter system, all the required preclinical courses would need to be given only once a year. The clinical courses would be repeated each quarter in order to utilize all the clinical material and to have small groups of students. At first glance this would seem a hardship for the clinical staff; but, as this teaching is largely the demonstration of patients in the wards and outpatient department, it is very little if any more effort than attending these patients, which must be done any way. W. C. Davison, *J. A. M. A.*, June 2, 1928, p. 1812.

Planning Postgraduate Medicine*

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Assuming to speak on this subject, one is instantly challenged with the question, "Why should there be 'Postgraduate Medicine'?" To which it is customary to reply, "To make better doctors." After all the expenditure during the last twenty years of energy and money to raise the standards and improve the facilities of undergraduate schools, is it necessary to provide further training for physicians in order that they may be able to meet the legitimate demands of the community for medical service? To you, who are gathered here, it would be superfluous to point out the vast extension of the boundaries of our science within half a century, or the various types of technical training required in present day practice. Let me postulate, then, that the present undergraduate medical course, be it four years in length, or five or six, is entirely inadequate to furnish the embryo doctor with all of the "knowledges and skills" (to borrow a phrase from our auto-intoxicated friends, the educational psychologists), which the highest welfare of his patients may demand.

Self-Education is Real Training

The real training of the physician begins after he has obtained his degree. It is trite, but worth repeating, that all education is self-education, that it cannot be injected with an alemite gun nor yet sprayed on like Duco. In our profession it is most rigorously true that assiduous self-culture is the price of success. The man or woman who lacks the daemonic urge to master every lesson presented in the disordered functions of the human mind and body should eschew the calling of Aesculapius. Nevertheless, there are aids to the process of self-education. We need not spend a life-time learning what Pasteur discovered about microparasitic diseases. Time can be saved by utilizing the experience of others. This is the purpose of organized postgraduate teaching—of all teaching.

Types of Physicians Seeking Further Training

What type or types of doctors are seeking opportunities for systematic study? From the viewpoint of function, there are two: the general practitioner, and the specialist. Economically, it is important to distinguish between those who have, and those who have not, established themselves in practice. We may consider, first, that group which consists of men who expect to engage in practice, more or less general. These are, as a rule, recent graduates, and the opportunities they seek are hospital interneships. Destitute,

*Read at the Thirty-eighth Annual Meeting of the Association held in Montreal, Oct. 24-26, 1927.

they pay for further privileges only with service. Not yet economically productive, nor yet encumbered with dependents, time is the one commodity with which they can afford to be liberal. Hence, they work for board and lodging, performing routine duties which are necessary for the maintenance of the hospital, but which are not designed primarily to benefit the internes. In some instances the training is invaluable, in others positively detrimental. The short rotating interneship, with three or four months of operating room experience, is responsible, I judge, as much as any single factor, for the large number of incompetents who are practicing surgery.

Men who have already entered on the practice of their profession come in a very different category from the preceding group. They have an established earning capacity, usually a family to support. Their time is precious and cannot be squandered in one or two year interneships with precarious returns. Physicians living in urban centers, where schools and hospitals exist, may continue in practice and devote a few hours a week at convenient hours of the day or night, to study. But those who practise outside of large cities must, like Mahomet, have educational opportunities brought to them or come to the schools themselves.

Medical Chautauquas

Of recent years much has been done in the way of organizing medical Chautauquas which bring sporadically to the doctors in smaller communities an exhibition of metropolitan technic. Such demonstrations, infrequent though they may be, undoubtedly constitute a valuable stimulus and an incentive to better work on the part of those who profit by them.

There are, however, many who feel the need of more continuous and intensive courses, who are willing to make the sacrifice involved in leaving home for the purpose of study. These have money to pay for instruction, but they demand that it be arranged for them with the least possible interference to their means of earning a livelihood. For them postgraduate schools were established and appropriate methods of instruction have been developed. Rarely can more than four to six weeks be spared from income producing practice, so a curriculum must be built up of monthly units. The nature of the restrictions to be placed on the content of such courses is a matter of dispute, but the decision is contingent on a determination of the precise function which is to be assigned to the general practitioner. If we agree with Dr. Billings that the family physician should be able, without aid from a specialist, to care for 85 per cent of the ailments which he encounters, we must place at his command every possible means of diagnosis and teach him to employ every therapeutic measure that does not require exceptional skill. Such

training for the average doctor would do much to refute this charge so commonly brought against the medical profession of excessive specialism.

Preparation for Special Practice

In another group entirely, rapidly increasing in numbers, are those who have definitely decided to limit themselves to some particular branch of medicine and for it seek an adequate preparation. Here especially we must distinguish between those who already have engaged in practice, and who have acquired experience, resources, responsibilities and economic value; and those recently graduated who have none of these attainments.

The latter can afford, and unless subsidized can only afford a course of training covering a period of years during which time they pay for their privileges with service. To the former we must furnish within a reasonable period of time a systematic, intensive, yet adequate course of training; or else we must exclude them altogether. There may be two opinions about the desirability of entering on special training immediately after the completion of an interneship. My own conviction is that this procedure is responsible for the criticism so frequently encountered, namely, that a patient after being referred from specialist to specialist and having undergone half a dozen or more examinations (at exorbitant prices), is still unenlightened as to the nature of his malady and not one of the doctors whom he has seen is capable of regarding him as a sick human being. A thorough, first-hand knowledge of medicine should be prerequisite to any special training.

Still another group consists of those who have for some time practised a specialty, but who desire further instruction or training in some particular phase of their work. Usually it is a matter of operative technic. It is extremely difficult to satisfy such men and calls for an almost fabulous wealth of clinical material.

Postgraduate Medicine of Future

One of the most important problems involved in planning for the postgraduate medicine of the future is the question of cost and its distribution. The financing of undergraduate medical schools has, we all know, within a generation undergone a complete metamorphosis. Where formerly a dozen doctors could form a faculty and profitably operate a medical school in a rented hall with no more equipment than a stove, a skeleton and a blackboard, we now find that schools are spending from two to ten times the amount received as tuition. The difference represents the philanthropy of the community, whether voluntarily bestowed by individuals, or state-appropriated from the tax levy. It is quite beyond the scope of my theme to inquire whether free or nearly free education, from primary school

through university, is a boon or a menace; but I would ask you seriously to consider the financial structure of postgraduate medicine before we become irrevocably committed to the policy of the undergraduate schools. Having regard to the ultimate welfare of our people, is it desirable that advanced training for physicians should become a public charge? Or were it better reserved for those whose ability enables them to acquire it for themselves?

Graduate Medicine

Graduate medicine is still a formless thing. Fortunately, it has not yet become standardized. There is a great deal of pioneering to be done before we shall be ready for a concrete highway. It has already been pointed out in a former meeting of this Association that physicians undertake advanced study of their own will and accord, and they exercise this freedom in choosing such courses as meet their requirements. To satisfy the varied needs of these students taxes to the utmost the resources of teachers and administrators alike. No one can read the record of present activities in postgraduate medical education as contrasted with those of ten years ago without being convinced that this phase of medical training is destined to become vastly more important than it has been hitherto, and that in another ten years, instead of being the Cinderella on our program, it may hold the spotlight and the center of the stage.

A Method of Teaching Anatomy

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As the method of teaching gross anatomy at the University of Wisconsin differs in some respects from that usually employed, a short description of the course may be of interest.

The general aims of the course are contact between student and instructor, development of a sense of responsibility in the student, and development of the appreciation that a mass of uncorrelated facts is not knowledge. A chronological discussion of the course may, perhaps, best serve to illustrate how we attempt to put these aims into effect.

In the early weeks of the course, a laboratory study of nomenclature, regions of the body and a general outline of the skeleton is undertaken. During this period instructors are on duty, one instructor to each twenty students. At the same time, our discussion groups are begun. These will be referred to again more in detail. This is followed by a more detailed study of the bones of the region on which the student is to begin dissection. A functional knowledge of the joints of his own body is also required. An examination on the work thus outlined is given before the student begins dissecting.

Choosing Time of Examination

Here comes our first departure from the usual method. By way of illustration, we may say that Friday of the fourth week is the date set for this examination. No one is required to take it on that date. We tell the students that we do not want to waste our time and theirs in giving examinations to those who are not prepared, and any one who feels that he is not ready on the date set may take it the next week or the second week following or later. We try to recognize at this point several factors. We attempt to get the student to have a realization that we want a finished piece of work and that is what counts rather than the time taken to do it. We want the student to form the habit of deciding for himself whether the work is done to his satisfaction, that he is working for himself and not for us. It also recognizes the differences that exist between individuals. Incidentally, of course, it takes care of absences because of sickness, press of other work, and others, incidentally including laziness.

Dissections Are Demonstrations

Dissection once begun is carried out as a series of demonstrations by the student to the instructor. The schedule for the thorax and superior extremity may be used as an example.

THORAX AND SUPERIOR EXTREMITY

1. A detailed quiz on the bones of this part, and the movements possible at each joint. The student is expected to give a personal demonstration of the latter.

2. Pectoral region and axillary fossa. The method of formation of the brachial plexus is included in this recitation, although it is not possible to see the roots and trunks until the posterior cervical triangle is dissected.

3. Superficial dissection of back, shoulder and entire superior extremity, including the volar and transverse carpal ligaments, the superficial volar arterial arch, and a general knowledge of the tendon sheaths of the wrist and hand.

4. Deep dissection of the shoulder girdle and arm, extending well below the elbow and including the cubital fossa.

5. Deep dissection of the forearm and hand, omitting the interosseous muscles.

6. Joints of the upper extremity and the interosseous muscles. A complete review of the axes of each joint and the muscles acting upon them is required.

7. A complete review of the work to date.

8. Anterior and lateral thoracic walls, pleurae, pericardium and heart and great vessels in situ. The student is directed to remove the anterior chest wall with minimum injury to the parietal pleura, to study the relations of the pleural and pericardial sacs, lungs, heart and mediastinum to one another and to the chest wall and to trace the phrenic, upper part of vagus and cardiac nerves before opening the pericardium. The mammary, anterior and posterior intercostal vessels, and the joints of the anterior chest walls are included.

9. Heart, lungs, trachea and bronchi. The student is directed to dissect the vagus and phrenic nerves in detail, then to remove the heart by cutting the great vessels within the pericardium. The coronary circulation is dissected carefully before opening the heart. A detailed study is made of the pericardium, pleurae and mediastinum.

10. Posterior thoracic wall, including the azygos system, thoracic duct, esophagus, esophageal plexus of the vagus, a detailed study of the thoracic sympathetics, and the intercostal nerves and vessels.

11. Thoracic joints and muscles of the back. The muscles of the entire back including those of the lumbar and sacral regions are dissected at this point. A general review of the thoracic wall from the standpoint of respiration is required.

12. Vertebral canal, spinal meninges, entire spinal cord, nerves, roots and spinal ganglia.

13. Preliminary examination covering the entire part. Roentgenograms and charts are studied in preparation for this examination.

14. Final examination.

Number 1 is the examination preparatory to dissection already referred to. Number 2 is the first dissection on this part. A student may take as long or as short a period as he finds necessary to make a satisfactory preparation. When he feels that he has it well done, he, along with one or more fellow students who are also ready, report to an instructor for a demonstration and discussion. The student points out and identifies the structures exposed and tells the instructor what he knows about them. The instructor by quizzing and discussion tries to emphasize the more important things and to give the student a correlated picture.

At first, we tried to grade both the dissection and the quiz. Now we only grade the dissection, and we find that we get a much freer discussion and that the instructor can do better work.

Quizzes

The number and content of each of the quizzes is still an open question with us. They are changed from year to year. To give more continuity to the part, we include one or more review quizzes as Number 7. Having a fair number of quizzes insures contact between instructor and student. Everyone has had the experience of a few students monopolizing his time. Unless an instructor is on his guard, he will find that he has little personal knowledge of many of his students. A schedule such as we follow insures each student a considerable degree of contact with the instructor. It is pointless to argue whether one should spend his time with the better or the poorer students. The pleasure derived from association with good students guarantees them an ample amount of instruction.

Number 13 is what we call a preliminary examination. Some other name would do just as well. At this time, both the student and the instructor feel equally free to ask questions or present problems as no grade is given. Here we try to find out whether the student has grasped the general principles as brought out in the group discussions, and whether he has a correlated idea of his part as a whole. This is, perhaps, the most instructive of our discussions. It is given by one of the older instructors and the student is made to feel that it is entirely for his good. The bugaboo of grades is absent.

Final Examinations

It is not possible to describe a final examination, except to say that it is an oral one, as are all of the others. The student chooses the time for this as in the other cases. As a matter of convenience, we divide the body into three divisions. If the final examination is the second part, the student is also held responsible for the first part. The final examination over the third part covers the entire body. Usually, our students know more about the first part at the time of the final examination than they did when that part was completed.

The group discussions have been referred to several times. One of the older instructors meets the class in sections of twenty or twenty-five once a week for a discussion of general principles, medical history or current anatomical literature or anything else that he chooses. The main purposes are to hold the class together and to stimulate a general interest in the work. It also aids the student in acquiring his vocabulary.

Preliminary to these discussions, the student is sometimes given an assigned reading and, often, typewritten sheets covering the field

in question. The sheet on joints may be used as an example. It has no inherent value except that of brevity and will serve to give a more concrete idea of what we have in mind.

JOINTS

One should begin with an appreciation of the fact that any union between two or more skeleton elements is a joint. It may be a union between two bones, two cartilages, or between a bone and a cartilage.

One ordinarily thinks of a joint as a region where movements occurs, but he must also realize that a large number of joints, especially before adult life is reached, are to permit growth.

There are several ways in which joints may be classified. The first is on a structural basis. Here we see whether the union is continuous (no joint cavity), or discontinuous (a joint cavity present).

Continuous joints, synarthroses, are further subdivided on the basis of the connecting medium, and we have the terms syndesmosis, synchondrosis and synostosis to master. Sutures also come in this general group. The range of movement is determined by the nature and amount of the connecting medium.

Discontinous joints, diarthroses, may be subdivided on the basis of the shape of the opposed surfaces or on the basis of the number of movements possible. The nature and the range of movements are determined by the shapes of the opposed surfaces and the length and strength of the capsule and ligaments.

From the shape of the opposed surfaces there are recognized irregular, or plane surface joints, ginglymus, or hinge joints, trochoid, or pivot joints, cochlear, or screw joints, enarthrodial, or ball and socket joints; condyloid and sellar, or saddle joints.

Movements are of two general types, sliding, which occurs in the plane surface joints, and circular or angular, with which we are mainly concerned. It is only necessary to move any segment of the body to appreciate that the part moving is marking out a sector of a circle or a series of concentric circles. A line through the center of the circle perpendicular to the plane of the movement is the axis.

Diarthroses may, then, also be classified on the number of axes around which movements may occur, and so we speak of uniaxial, biaxial, and multiaxial joints. Each of these is to be studied.

A knowledge of the terms used for the various movements is necessary. In general, we use the terms flexion and extension; abduction and adduction and rotation. In addition, in special cases, we have the terms depression and elevation, protraction and retraction, pronation and supination, and inversion and eversion.

Each diarthrodial joint will present for examination the articular cartilages covering the joint surfaces, a joint cavity with its synovial fluid, a joint capsule and the synovial membrane. In addition there may be special structures as ligiments, menisci, labra and articular discs. The functions of these must be appreciated.

Bones, joints and muscles form a natural unit, and bones and joints will be discussed further with the muscles. As a supplement to the section on muscles in Morris' Anatomy, the joints of the body with the principal movements and the axis for each movement are listed.

Through the courtesy of the Bibliographic Service of the Wistar Institute of Anatomy and Biology we have been able to give each of our students a copy of their advance abstract sheets. This enables us to give the student an appreciation of current literature. Occasional lectures, of a general nature, are given from time to time.

Students Assume Responsibility

It will be seen that, in general, the students are required to take most of the responsibility. They work when they choose, set the time for demonstration of their dissections, and select the time for their preliminary and final examinations. The only required attendance at which a roll call is taken is the discussion group. A natural question is, how all this affects the time that the instructors are required to spend. We still find it possible to have the instructors follow a definite schedule. Each instructor teaches four three-hour periods per week. Final examinations are held twice each week throughout the year. In general, we do not feel that the work of the instructor is increased in hours, though it is, probably, true that he works harder during the hours that he is on duty.

End Results

What are the end results? No attempt will be made to compare them with those obtained under other methods. In general, I think we can say that our students become independent of the instructors in that they do not wait for an instructor to tell them what to do. Our students are permitted to work evenings and holidays if they prefer that to the regular scheduled hours. Vacations are often our busiest periods. During the last Christmas recess there have been enough students in attendance to keep half of our instructional force busy. That, at first, seems a hardship, but the instructors are permitted to so arrange the work among themselves that no one suffers. They are also permitted the fullest freedom in substituting for each other during the school year so that any one may have a free period when he desires it most. With both students and instructors the standard is *work done* not *time spent*. Our better students, if they wish, may finish the work several months in advance of the majority of the class, two months earlier is not unusual. The slow student, or the good student who has had some special interest, may finish during the summer months. We worry little about our students as they feel, and we feel, that the problem is primarily theirs.

No one person is responsible for the development of the system described. The course is changed from year to year, many of the best suggestions coming from students and student assistants. Our greatest danger would seem to be in feeling that we have a good method of teaching human anatomy. Our experiences in the final examinations are a sufficient safeguard against that, for our students sometimes know less than would seem possible under any system.

A Practical Roentgenographic Teaching Collection

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While it is true that medical students are given opportunity during their clinical years to view roentgenograms depicting the striking pathology of advanced or unusual diseases, it frequently happens that they graduate without having had ample opportunity to study carefully films showing the normal condition, or to become acquainted with the roentgenographic appearance of minor pathologic lesions. In order to remedy this deficiency, it was suggested two years ago by Dr. Arthur Dean Bevan that some scheme be devised by which students at Rush Medical College might be shown normal roentgenograms and have access to them for study much the same way as they use books in the library.

With this in view, a careful selection was made from the films available in a very extensive file of material. Plates which were technically unusually good and which demonstrated emphatically the condition present in the patient were selected as the material for the teaching collection. Views of normal joints and bones for various ages were selected, including infants, children and adults. Particular attention was directed to the inclusion of material to illustrate the appearance and development of the epiphyses, and care was taken to have good examples of such conditions as calcifications of subdeltoid bursae, periostitis, the various types of fractures, calcification of normal structures, and the commoner bone diseases.

New envelopes of heavy paper were provided to hold the assembled films, and these were then assorted by size and number. The plates used were of four different sizes, approximating 6x8, 8x10, 10x12 and 14x17 inches. Since there were to be no more than four hundred films in the projected collection, it seemed best to number the smallest films from 100 to 199, the next size from 200 to 299, and so on throughout the series. These numbers were also placed on the lower right hand corner of the envelope enclosing the film as well as on the film itself.

Method of Marking Films

After numerous trials of various methods of marking the films, it was found that ordinary red ink, applied with a round pointed pen, gave the most satisfactory results. With a little practice, the application of the ink to the film was carried out without damage to the surface or the continuity of the coating. Whenever ink was applied to the gelatine coat of the film there resulted a raised, moist and easily abraded are due to the water being absorbed by the gelatin, and for this reason when once marked, the films were han-

dled gently and set aside to dry for an hour or two, allowing nothing to touch the marked areas because of the ease with which the moistened coating became removed.

The serial numbers were placed on areas of the film which had not been exposed, or on lightly exposed regions in the film where their presence would not obscure the objective for which the film was selected. Notations regarding the age and sex of the patient and the diagnosis were added after the numbering was done, and, where necessary, special notations were made to explain the details of the more unusual pictures.

A large wooden filing box was provided which was divided into four compartments for the four sizes of roentgenograms used, and the depths of the compartments were arranged so that when the films were placed in them, the edges of the envelopes bearing the serial numbers were towards the open end of the box. This arrangement made it very easy to select any desired film by number as all were as easily accessible as the pages of a book.

Index for Film Collection

An index for the collection was made, framed under heavy glass, and hung on the wall near the filing box containing the films. This index consisted of three main divisions. The first part of the index listed the serial numbers in order, and showed opposite each number the "diagnosis" of the plate. The second portion of the index was an alphabetical listing of the bones, joints and regions of the body, and under each of these headings, reference by serial number was made to all films bearing on the point in question. The third division of the index was an alphabetical listing of pathologic diagnoses and made reference to the serial numbers, as in the case of the second division. A student may refer to the list of serial numbers in the first part of the index and learn what it was intended that a given plate should demonstrate to him. If he has a roentgenogram of a given region in a patient whose case he is studying, and wishes to compare it with the normal plate of the same region, he has only to look under the proper heading in the second part of the index to find a plate of the same region of about the age of his patient. Should he wish to become familiar with the appearance of tuberculosis, syphilis, osteomyelitis or fractures of various bones, by consulting the third portion of the index he may find a list of all the plates depicting the particular disease sought.

The collected films are placed near a large, well lighted illuminating box with which several plates may be examined at one time and interesting comparisons made.

The extent to which this collection has been used by the students, and their appreciation of its presence in the clinic, has encouraged

the originator to extend the number of films considerably, and to devote more time to informal conferences on the subject of roentgenological interpretation of the early changes in bone and joint disease.

A Curriculum of Three Calendar Years of Forty-four Weeks Each

The Duke University School of Medicine proposes to put into effect a time saving curriculum in keeping with the present trend in medical education. The advantages to the medical student are obvious. He will be one year younger at graduation and will have an additional year for hospital or other training; he will be better prepared, for he will not have lost a fortnight or a month in October of each year getting back into the intellectual stride which has been his in the preceding June, and he will see the clinical material peculiar to the summer months.

	Hours
First Year: Autumn quarter (1st)	
Anatomy (including histology)	429
Free time	0
Winter quarter (2d)	
Physiology	160
Biochemistry	144
Free time	125
Spring quarter (3d)	
Pharmacology	56
Bacteriology	88
Psychobiology	16
Free time	269
Summer quarter (4th)	
Free time	429
Second Year: Autumn quarter (5th)	
Pathology	288
Free time	141
Winter quarter (6th)	
Clinical microscopy	96
Medical psychology	16
Physical diagnosis	160
Preclinical examinations	39
Free time	118
Spring quarter (7th)*	
Medicine (junior) (including pediatrics)	296
Free time	133
Summer quarter (8th)*	
Surgery (junior)	144
Obstetrics (including gynecology)	108
Free time	177
Third Year: Autumn quarter (9th)*	
Specialties (junior)	112
Free time	317
Winter quarter (10th)*	
Medicine (senior) (including pediatrics)	312
Free time	117
Spring quarter (11th)*	
Surgery (senior)	256
Free time	173
Summer quarter (12th)*	
Final clinical examination	39
Free time	390
Summary:	
Total hours of required instruction, 2,759 (54%).	
Total hours of free time, 2,389 (46%).	
Total hours in curriculum, 5,148 (100%).	

*The clinical instruction should be repeated each quarter in order to utilize all the clinical material and to have small groups of students. Consequently, students may vary the order of the seventh, eighth and ninth quarters; and also the order of the tenth, eleventh and twelfth quarters.

W. C. Davison, *J. A. M. A.*, June 2, 1928, p. 1812.

Administrative Personnel of American Medical Schools*

G. Canby Robinson
Dean, Vanderbilt University School of Medicine

It has long been the custom in our medical schools for the administrative responsibilities to be carried by some active member of the teaching staff, usually by a member who is of professional rank and head of one of the major departments. This member has been generally designated as dean, and he has been appointed by the trustees or governing body of the school with the advice or acquiescence, I presume in most instances, of the faculty. There was a time when the duties of the dean could be discharged in a more or less perfunctory manner, and with little assistance or expense, so that they did not apparently interfere with the proper performance of professorial functions. But times have changed, and now the administrative duties have become so large that they cannot be fulfilled unaided without serious interference with academic activities. The main reasons for this change are: First, the increased responsibilities that have resulted from expansion of budgets and plants, the development of stricter educational discipline, the institution of more rigid investigation of students desiring to study medicine, and the widening of the horizon of medical education. These have all added greatly to administrative responsibilities. Second, the demands on professors in our medical schools have greatly increased, as the university spirit has rapidly made itself felt in American medical education, and has brought with it the responsibility to conduct and direct research in all departments, and has called for liberalizing of teaching, individualizing of students and directing the work of enlarged staffs.

Within the past few years many changes and experiments have been made which aim to meet the problems that have arisen from the situation of an academic body struggling to carry on a rather complicated administrative task within its own ranks. It may be of value, therefore, to bring before a meeting of this Association, at which the majority of the deans of our medical schools foregather, a discussion of the personnel that is now needed to carry on properly the administrative functions of our schools, and to present some of the problems that have been encountered personally.

The Medical School and the University

Although nearly all of the medical schools are now integral parts of universities, they stand somewhat apart and distinct. In a few

*Read at the Thirty-eighth Annual Meeting of the Association held in Montreal, Oct. 24-26, 1927.

institutions a committee of the trustees is designated for the purpose of giving special care to the medical school, but I suspect that such committees do not render service of unusual value. I am also inclined to believe that university presidents do not feel that they have as strong an attachment to or as intimate knowledge of their medical schools as they have of other parts of their universities. This may be the result of the technical character of the educational problems with which they have not been, as a rule, familiar. It may be due, in part also, to the temperamental or traditional attitude that members of the medical profession have had from time immemorial regarding their right to govern the apprentices to their profession. This attitude is first expressed in the Hippocratic Oath. It is caused also in a number of instances by the fact that the medical schools are geographically separated from the major part of the university.

In recent years, however, there has been a steady change in this respect, partly because medical schools have increased in importance in the universities, partly because of a growing tendency to emphasize medical education as true university education, and partly because of the tendency of medical schools to become much more nearly merged into the universities, so that in some instances the medical sciences are cultivated as true university departments, rather than being set aside as departments of medical schools. Members of the medical profession have, here and there, been selected as university administrators, and this, too, has been influential in arousing greater interest in medical education on the part of the heads of our universities. This increasing interest, and the greater participation of university administrators in the problems of medical education, is evidence of important progress.

Administrative Problems

The fact that medical schools have, in many instances, become definite and integral parts of universities has not, in any way, diminished the administrative burdens that must be carried by the medical school itself. On the contrary, these burdens are increased, as the standards and methods of university graduate schools have come to be those in medical education. It is true that certain administrative officers of the university, such as the treasurer, comptroller and, in a few instances, the registrar, may take over certain functions of the medical school administration, but it still remains that the real administrative head and educational leader is selected from the ranks of the teaching personnel of the medical school.

The administrative problems of the school revolve about the dean, and the question I had in mind in suggesting the subject of this paper is how these administrative problems can be met success-

fully from within the ranks of the teaching staff and at the same time do the least amount of damage to the academic efficiency of the staff. One answer to the question would be to choose for dean the member of the faculty who had proved least efficient in fulfilling his academic activities. But as far as I know this method has never been put into operation successfully. It is true, that in a few schools there are full time deans, who carry little or no departmental work, but these have usually gone through with the experience of struggling with the headship of a department and with the deanship, and have finally found that this double life was hardly satisfactory. Of course, the administrative burdens are much heavier in some schools than in others, for reasons that are obvious, and a suitable incumbent of the deanship may also be found whose academic responsibilities are relatively light. But I am sure, that there is a consensus of opinion that the dual rôle of department head and dean places a heavy burden on any energetic man.

The Dean

There is no department of our schools that seems especially fitted to furnish deans, as a perusal of the announcements of 53 four-year schools shows that the deans hold the following academic positions: Professor of pathology, 8; professor of medicine, 7; professor of surgery, 6; professor of anatomy, 6; professor of gynecology, 3; hospital director, 3; professor of pediatrics, 2; professor of otolaryngology, 2; professor of clinical pathology, 2; professor of physiology and pharmacology, 1; professor of chemistry, 1; professor of hygiene and dietetics, 1; professor of experimental medicine, 1; professor of pharmacology and therapeutics, 1; professor of physiology, 1; professor of therapeutics, 1.

There are five schools whose deans have either no professorial title or apparently do no teaching, while in two schools the title of dean does not exist. These last two schools have a chairman of the faculty.

It is interesting to note that of the 45 deans in this list holding professorships, only 12 are members of preclinical departments, while 33 may be classed as clinicians, if the hospital directors and the professor of hygiene and dietetics are included in this group.

Duties of the Dean

No doubt, the duties of the dean vary greatly in different institutions. They are determined by the responsibility that is put on him by the traditions of his school, by his own energy and vision, and by the problems that are created by needs and faculty activity. These duties may be lightened by the ability to organize and to delegate successfully portions of the administrative details, by financial resources to engage competent associates and assistants, and by a

form of school organization which facilitates the carrying of administrative responsibility by a selected group of the teaching staff. It is the means by which the burdens of the dean can be lessened that deserves particular attention, unless the necessity of the full time dean is to be generally accepted. There are pros and cons, I believe, in regard to the full time dean of which I shall speak presently.

The functions of the dean, as I have seen them in three different schools, may be divided into four relationships.

1. Those with the university president and through him to the trustees.
2. Those with the heads of departments and teaching staff.
3. Those with the students.
4. Those with the public.

1. The Relation of the Dean to the President and Trustees of the University.—The dean is responsible to the president of the university as the representative of the trustees or corporation, by whom he is appointed, and from whom all funds are received. He is charged with making effective general university policies, and with keeping the activities of the medical school in conformity with these policies. The dean is the medium through which the financial resources of the institution are proportioned and the financial needs are expressed. The manner in which this function of the dean is exercised differs radically in different institutions, especially in regard to the manner in which budgets are made up, and in regard to the relative publicity given to details of the budget. Although I am strongly opposed to the exercise of autocratic methods by the dean in all matters of educational policy, appointments and other internal arrangements of the medical school, I am convinced that the financial control must be a matter primarily regulated by the president of the university in cooperation with the dean, and all financial matters beyond the expenditures within departmental budgets, should be the duty of the dean, and should not be subjected to general discussion by the teaching staff or heads of departments before or after the budget is adopted. For this reason, I disapprove of a detailed budget of the school, as a whole, being put into the hands of the heads of departments or of being otherwise made public. For the sake of convenience or assistance, a small executive committee may participate in the financial functions, but such a committee should be agreed on by the dean in conjunction with the president of the university before its appointment. This plan calls for confidence by the heads of departments in the wisdom and fairness of the dean and in his equal interest in all departments of the school. But I am sure that this plan is a factor in the maintenance of cordial relations and of a unity of spirit. In order to carry out this function properly it is necessary that the dean have a clear understanding of the avail-

able resources of the school, and he should be familiar with all the details of the financial administration of the medical school which is generally conducted by the central financial officers of the university.

The dean is also charged with transmitting in proper form all recommendations of the faculty that require action by the president or trustees. This function may in some instances require a considerable amount of judgment in expanding and interpreting the recommendations of the faculty, especially when the university president fails to take an active part in faculty deliberations and is not familiar with the spirit of the medical school and motives of the faculty.

2. The Relation of the Dean to the Heads of Departments and Teaching Staff.—In the majority of our schools there now exists a small executive body representing the faculty responsible for the educational policies and other administrative plans. The various committees of the school usually report to this executive body and make recommendations for action. The dean is the executive officer of this body. According to school announcements, of 54 schools, 32 have such a body, while in the announcement of 22 schools no mention is made of it. Of the 32 schools, in 19 the heads of major departments are members of this body, but in some instances it is not composed of departmental heads alone. In 13 schools, the executive body is not selected on the basis of professorial position, but is formed apparently by appointment by methods not revealed.

These executive bodies are variously designated, the terms executive committee, executive faculty and administrative committee being used 6 times, each. In 4 schools it is called the advisory board and in an equal number the council or medical council. The term administrative board is used 3 times, advisory committee twice, advisory council and committee on educational policy are used once each. Although one may ask "what's in a name?", I believe this wide variation in nomenclature indicates a somewhat different point of view and method of procedure in the different schools.

The Executive Faculty

In my opinion, the term executive faculty best expresses the functions that this executive body performs or should perform. I believe also, that the executive faculty should primarily consist of the heads of major departments, but that this body should be formed by individual appointments by the trustees of the university, to whom it is responsible. The executive faculty so constituted should form a representative government with every member of the teaching staff represented by the head of his department. The departments should, then, be so conducted that the head of the department knows the problems before each member of his staff, and can present these

problems to the executive faculty whenever they go beyond the bounds of intradepartmental administration. If a feeling exists that for any serious and sincere reason some portion of the teaching staff is not properly represented by the heads of the major departments, additional members should be added so that the governing body of the medical school is truly representative. But this principle cannot be carried far. The executive faculty should consist, as is generally does, at present, in our schools, of from ten to fifteen members, and instead of increasing this number, it is preferable to reorganize the faculty, making all members of the teaching staff responsible to interested, energetic and wise heads of major departments. This may be a difficult task.

With an executive faculty so constituted, the dean should submit to it educational and other university problems, and seek for a solution by the combined wisdom of the leaders of the school. Unless a decision is contrary to general university policies, the dean should be bound to follow the decision reached by the majority of the executive faculty. It should also be the duty of the dean to see that no action is taken contrary to university policies, unless the president is an active member of the body, as is highly desirable, when this duty falls on him.

A representative executive faculty renders it unnecessary to submit to the general faculty matters of policy, details of arrangement, appointments of professors or other matters so difficult to settle in large gatherings of people, many of whom are not familiar with the fixed purposes and details of the school. I have gained the impression that meetings of general faculties are being held much less frequently than formerly, and the administrative functions of the schools are being improved definitely by this fact.

The Dean: A Scientific Director

Besides the administrative relationship which the dean has to the various departments of the school, there should be and often is that of scientific director or coordinator. It is highly desirable that the dean should have an appreciation of the scientific activities and the research problems being pursued. He needs to evaluate the relative importance of the problems under investigation and to know where the usually limited funds for the support of research can best be expended. He should recognize the importance of brilliant scientific achievement, so that it can be, as far as possible, protected from interference by routine duties, and so that it can be fostered by increased facilities and expanded staff. This phase of the deanship often requires critical judgment, and the relative importance of scientific work can be evaluated only by a fairly intimate knowledge of the problems under investigation in the various departments of the

school. This matter has a direct bearing on making the resources of the school yield the greatest possible return, which may be counted among the duties of the dean. Encouragement and stimulation of scientific work is very desirable, but it cannot be accomplished effectively by superficial knowledge or by casual remarks. It takes time and thought.

3. The Relation of the Dean to the Students.—This relationship at once implies certain obvious duties. The dean must control the educational machinery, and exercise responsibility as to the proper conduct of classes, laboratories and clinics. He must also see that the various regulations of the school as to registration, attendance and behavior are enforced. He can hardly escape participation in the arduous task of the selection and rejection of applicants for admission, and he is generally expected to have an intimate knowledge of the work of the various committees that have to do with details of instruction.

Educational Policies

But as I see it, the dean has a larger and more telling duty as the leader in educational policies, in educational progress and in the determination of the intellectual spirit of the student body. It is the duty of the dean to make effective the recommendations and suggestions arising from such gatherings as the annual meetings of this Association and of the annual Congress held by the Council on Medical Education of the American Medical Association. Although the function of educational leadership is exercised in a large measure through the relationship with the heads of departments, it also calls for a relationship directly with the students, expressed by words and action.

The problem of the irregular student, the individual problems of discipline, of social or financial maladjustment add to the varied burdens of the dean. These matters, with which this audience are perfectly familiar, are recounted only in an attempt to complete the picture, in which there are, I am sure, numerous omissions.

4. The Relation of the Dean to the Public.—It is to the public, in the last analysis, that all education must look for support, and medical education is no exception to the rule. Sources of revenue differ; for instance, in state supported institutions from those that are dependent on private endowment. The appeal for popular confidence and support must go on in every school, no matter what financial backing it has, in order to obtain the huge sums that our medical schools have learned to spend with such true justification and with such important results for the common good. The raising of funds is, undoubtedly, primarily a function of the trustees and president of the school or university, but the impetus and the arguments must come from within the medical school. The plans for

expansion, the program for enlarged budgets and the caring for pressing needs, of which there is never a lack in a university school with an energetic faculty, must all be given careful consideration by the dean before they are passed on to the president or trustees, or before they can be presented to possible benefactors. After carefully worked out appeals are prepared, it is usually desirable that they be followed up by the dean, and many conferences and diplomatic negotiations may be required.

The Medical School and the Public

A medical school cannot afford to hide its light under a bushel. Publicity is desirable and necessary, but it must be effected with caution, accuracy and good judgment. The public has a true and justified interest in medical education and a truthful statement of scientific and educational achievement is not only proper, but necessary. Here, again, the dean should have a well defined policy, which it is his duty to execute.

Additional resources of a university available for medical education do not fail to bring further responsibilities to the dean. Plans for new buildings, adjustments of the existing plant to accommodate expanded departments, and sometimes thorough-going reorganization of the school and faculty, with new affiliations, are all matters within the experience of many present-day deans. The drain on energy, time and thought which our rapid recent expansion has necessitated has been felt by a large number of us.

Enough has been said to indicate the arduous and varied duties that are usually centered today in the office of dean of our university medical schools. The description is drawn from my own experience. I am sure that all activities are not mentioned, but at least the list is sufficiently long to indicate that the task of discharging these duties is no small one, and when combined with those of a professor who is head of a department or with those of a hospital director, more is included than is humanly possible to do with equal efficiency. The solution of the problem has been met by dividing the administrative functions with other faculty officers, by the employment of well trained nonprofessional assistance, and, in a few instances, by freeing the dean of all professorial duties, so that he devotes his full time to his administrative responsibilities.

Division of Administrative Functions

The division of administrative functions with other faculty members is now done in most of our schools. In fourteen schools there is a secretary of the faculty, chosen from the faculty. There is an assistant dean in eleven schools, an associate dean in three, a vice-dean in two, a chairman of the faculty in several schools, a junior

dean in one, and in two schools the office of registrar is held by a member of the faculty.

In seven schools, the registrar is a man of college education, indicated by a bachelor's or other degree, and in three schools the term executive secretary is used, one of these officers having a Ph.D. degree. In all, there are thirty-nine schools with officers that may apparently be considered as colleagues, rather than assistants to the dean. No conclusions can be drawn from the statements in school announcements what division of administrative duties has been effected, although the titles are of some significance in this regard. I have refrained from an investigation by questionnaire, and in so doing I have spared the dean or his office force from performing a task which should, perhaps, have been included in the already long list of administrative functions.

The Full-Time Dean

The arguments for and against the full-time dean may be referred to briefly. The reasons in favor of such an officer have been set forth by recounting the many and constant problems that the dean has to face. The principal arguments against the appointment of a full-time dean, as I see them, are, first, placing the leadership of the school in the hands of someone who is not actually engaged in teaching and especially in research. Such a dean may not have had, or may lose, academic standing as a scholar and educational leader. He may fail to have the keen sympathy with research and other intellectual activities when he is not actually in contact with them. He may become autocratic because he is, in a sense, placed apart and above the teaching staff. The financial resources of a school may not justify the support of a dean carrying no academic duties.

On the other hand, the university president has long been divorced from class room, library and laboratory in our larger universities, and, no doubt, some fine scholarship has been lost by this necessity. In the same way, our larger university medical schools may need full-time deans, and to furnish them, the progress of medical science or practice may suffer. Whenever an active, stimulating teacher and investigator is called on to fill the deanship of a school, every effort should be made to obtain sufficient faculty and non-professional assistance, so that there is a minimum curtailment of his valuable academic activities. The dean should fulfill the requirements of leadership academically, educationally and in the field of executive work, and the higher the academic standards of the school the more difficult it is to satisfy this leadership.

The Rotating Deanship

In some countries of Europe the deanship is rotated annually among the heads of the university departments constituting the med-

ical faculty. In Denmark, the professor holding the deanship has two votes instead of one when legislation is enacted. This rotation of responsibility has not proved successful in American universities, as far as I know of its trial, and it is against our university traditions and established method.

I mention it as one solution for the problem of fixing administrative responsibility, but without crippling academic effectiveness over a long period of time. This method is less objectionable on the continent of Europe where the medical school does not exist as an entity, as with us, where each department tends to have academic autonomy, and where there is much less activity in expansion and educational experiment. There, too, governmental influences are more marked, and ministers of education have power.

I do not advocate this European method for adoption in this country, although it may prove to be of value when our schools take on still further the character of true universities, with a definite and efficient central government, with an administratice staff to conduct for the university, as a whole, many functions now conducted by the medical school for itself. We are tending, however, in this direction.

Ideal Administrative Arrangement

In conclusion, I wish to sketch what seems to me to be the ideal administrative arrangement for our medical schools. *First,* an influential board of trustees, thoroughly interested in medical education, and ready to make every effort to meet the financial needs of the medical school. *Second,* a university president who actually participates in the deliberations regarding the educational policies of the school, who gains as much financial support for the school as its legitimate needs require, and who has a sincere appreciation for the true university functions of the medical school, especially for its research activities, as he has for other parts of the university. We should not expect unusually favorable treatment out of harmony with the remainder of the university.

Third, an executive faculty composed of the heads of the major departments, which is representative of all members of the teaching staff. This body should make all recommendations to the trustees regarding educational matters, and should direct the educational policies and progress of the school. It should not, however, deal with financial matters, in so far as the school as a whole or the making of budgets is concerned.

Fourth, a dean who has the confidence and good will of all members of the executive faculty and who exercises educational and scientific leadership, and who has a true and equal interest in all departments and developments of the school. He should maintain his academic status either as a departmental head or as an important

member of a major department. He should be able to deal successfully with the president of the university in financial matters and in general university policies; he should exert a leadership over the student body, and should properly administer the educational regulations laid down by the executive faculty. He should be competent to represent the school to the public, and to other institutions.

Fifth, a proper organization behind the dean. This should consist primarily of a colleague to whom many of the administrative details may be allotted or assigned, and a nonprofessional executive secretary or registrar, who should be a man of academic standing, trained in educational administration. Other assistants, clerks and secretaries should be furnished to the number necessary to relieve the more highly trained, and presumably more highly paid members of the administrative staff, as far as such relief is possible, and as far as the resources of the school will allow.

Such a plan will, I believe, permit the continuance of the method now being generally employed of placing the administrative responsibility for the school in the hands of one of the faculty who is selected for the qualities of head and heart which constitute the type of leadership we desire without forcing such a man to retire from his position in the academic world, a sacrifice which should be resisted by our faculties and by our professors.

Discussion

Dr. William Pepper, Dean University of Pennsylvania Medical School, Philadelphia: I have been both a part-time and a full-time dean. I have been dean for the last fifteen years, and the first five years I taught ten hours a week and tried to practice medicine. I had few patients and was visiting the wards of two hospitals, and, apparently, I was able to give satisfaction because I was retained in the position, which was a yearly appointment, but for the last ten years I have been a full-time dean. As I look back over the fifteen years, I see a great improvement in what little I have been able to do during the past ten years.

I want to speak a word in favor of the full-time dean. The work in a dean's office varies in amount from day to day, from week to week. There come periods when the dean is very busy, and there are other periods when there is very little to do. A full-time dean, in his spare moments can learn a great deal more about what is going on in his school and laboratories, what research is going on, what is happening in the hospital, and what is going on in the extramural work in other hospitals, by visiting those laboratories, lectures and so on. I am in the habit of dropping in for five minutes at lectures and sitting down in the back row and listening. At first, some of the teachers thought I was there in a critical spirit and, perhaps, resented it a little bit. When they found that I was doing it more out of interest, because I wanted to hear what they said, they became used to having me drop in, and so there practically is not a teacher to whom I have not

listened for a few minutes, and a few minutes gives you a pretty good idea of what is going on, if you do it once a year.

I think no head of a department, no matter how well assisted by secretaries, registrars, and all the various officials listed by Dr. Robinson, can begin to get a picture of what is going on as well as can a full-time dean. Of course, it is not easy to get someone willing to give full time service as a dean, but if you can get someone, I think it is much better than saddling the work on the head of a department. As I look back on the past years when we had no full-time dean, I can see the amount of time my predecessors devoted to routine work in the dean's office, the sacrifice made of their time, which should have been devoted to their research and teaching.

Dr. S. P. Brooks, President Baylor University, Dallas, and Waco, Texas: As I listened to this interesting discussion, it occurred to me that it might not be without interest to you for me to show just a little bit of the evolution of an administrator's attitude toward a medical school. (Suffer the personal word.) Twenty-five years ago, I became president of this institution. A group of enterprising doctors running a stock company medical school in the growing city of Dallas, Texas, taking the far look and recognizing the end of that sort of an institution, unloaded the institution on us. I was not wise enough in years or experience to see what we had taken hold of, but as the story goes, when a foundling is laid on the doorstep, there is surprise, a sense of disgust, and a query as to what to do with it. It is accompanied by toleration, then love and adoption. So, when this institution was laid on our doorstep, a similar mental attitude went out toward it. With some knowledge on my part as to academic standards and what little I had come to know within a year as to medical standards, I had no feeling of honor when I conferred the degrees on the first class. However, it was ours, and I began to study some of the problems incident to your work. I heard of you and of associations like yours and I began to go to them. You shoot over my head most of the time, but I have come, at least, to form a better estimate of what constitutes a physician by comparison.

I grew up on the frontier of Texas. When Barnum and Bailey's circus first began to come, we were informed with a patronizing air by people who had traveled, that we had only a part of it, but when I was a Yale college student, I forthwith went to Barnum and Bailey's show and found it was just as it was in the towns of Texas. So, amazing to say, those of us who have not traveled, suppose that all wisdom is elsewhere and some supposed that all knowledge was out of Texas. At least, we have learned somewhat of the unity of the human race by what we see and you are quite like some others I knew before I knew you.

This has helped me, but when I came along with my associates to your meetings, I was on the outside looking in. I have come to know—and this is not immodest—that you were wise to keep us out, and when your inspectors came to see us, it was intensely embarrassing, and now that we have the grade of membership with you, your inspectors won't even visit us. We wish they would.

Now, my friends, I thought in reciting this I would at least make appreciative remarks as to what was shown in that paper as to the attitude of

the college president toward the medical school. I bear testimony that the organization is as title-bound to that of the trustees as any other of the departments of the liberal arts, and that the administration as to finances, as to discipline, as to curriculum, are just as much in the hands of the president and his collaborators in the medical faculty, as binding, and as certain of execution as would be in the college of liberal arts. It ought not to be less. You would not have it less.

I have observed these young men as they have come to us, from year to year. I speak to them at the opening of each session. Notable to me is the growing intelligence shown in the faces of the men of higher skill and better training of pre college standing wherein 40 or 50 per cent of them are now bearing the Bachelors' Degrees. Even so far away as Dallas, Texas, these young men out of college have caught somewhat your spirit and the spirit of the institutions of the North and the East.

Gentlemen, we do not have your great buildings nor yet your great laboratories, but we do have some teachers with as great a spirit as that wonderful pedagogue, Dr. Chipman, who talked yesterday about obstetrics, and though I know nothing of that, I think I know a teacher when he talks and I would vouch for him as a teacher.

I have been coming to these meetings for a number of years and I shall go away from this one, with the highest appreciation of what you are doing and trying to objectify us in the little institution I have the honor to preside over.

Dr. Ray Lyman Wilbur, Stanford University, California: I was somewhat reluctant to say anything about this paper until the preceding speaker mentioned the circus. That reminded me at once of the normal attitude taken towards the leader, illustrated by the story of the two Irishmen who went to the circus and for the first time saw an elephant. He happened to be somewhat asleep and they fell into a debate to to whether he was alive or not, and whether he had a head. They found something like a tail at each end. Finally one of the Irishmen took out his knife and slipped it into the elephant's leg. The elephant resented it and picking him up threw him over the fence. The Irishman picked himself up and shaking his fist at the elephant, said, "You big spalpeen, if I knew which end your head was on, I'd give you a kick in the seat of the pants."

People have to have somebody to kick and it must be the deans. As a matter of fact, on this Contient leadership of the type provided by the dean is absolutely requisite to progress. If we were settled in our ways, the way they have had to become in most European centers, we could tolerate placidity and let the Government run things; but in our period of promotion we must have leadership to advance, and one can trace in most of our institutions the benefits that have come from the initiative of certain individuals.

I quite agree with what Dr. Robinson put in his paper that the faculty as an administrative group is a failure. Faculty meetings are desirable. You rather have to have them once a year, too, so that the faculty may get acquainted with each other; but as an administrative group they are relatively ineffective. That, I think, everyone should realize if they want to make a medical school move forward—somebody must run it.

The real difficulty, it seems to me, in this whole problem of the medical school is the proper administration of the hospital facilities. The hospital is a great big business. That business must be conducted in such a way that it is favorable to education and to teaching, or there can be constant obstruction. The great need in administration is to hook up the hospital and out-patient machinery in such a way that education of the student there becomes the primary thing. This means definite coordination between the administrative heads of the medical school departments and the hospital mechanism. Most institutions have had their comparative failures through clashes between hospital management and clinical groups of one kind or another.

One method is to use the heads of the clinical departments as members of an administrative board acting with the hospital superintendent in the handling of the actual problems of the hospital. That is the method I think most likely to succeed. Then the full responsibility of hospital decisions come upon these administrative heads, and they are at the same time able to bring to the physician superintendent the intimate responsibility he has to the nurse, the medical student, and also to the patient and the public. Finances alone, and particularly certain types of economics, must not be the determining factor. I think that Dr. Robinson should take up this particular question in a subsequent paper. He has had a shifting experience with different groups, and as our most expert traveling dean, should provide us with more information along that line.

Dr. W. S. Leathers, Nashville, Tenn.: At Vanderbilt we have a committee in charge of the hospital administration which serves as an advisory committee to the superintendent.

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DR. FRED C. ZAPFFE, Editor, 25 East Washington Street, Chicago

Indianapolis—October

The thirty-ninth annual meeting of the Association will be held in Indianapolis, Indiana, October 29, 30 and 31, 1928. The Hotel Claypool will be headquarters.

The program is almost ready and promises to be a most interesting one. Topics that appeal to the administrative officers of medical schools are stressed. One of these is "Methods of Selection of Medical Students," which will be discussed informally after a preliminary report is made by the Committee on Medical Education and Pedagogics. Contributors to the program have been asked to conform to a ruling made by the Executive Council to the effect that the presentation of a paper shall not exceed twenty minutes, thus giving opportunity for more discussion and obviating the need for hurrying through the program. All papers will be published in full, as written. This action will, without doubt, meet with unanimous approval.

It is planned to meet in Indianapolis on Monday and Wednesday, in Bloomington, the seat of the university, on Tuesday. Thus opportunity will be given to visit the departments of anatomy and physiology which are located on the university campus. The trip will be made by autobus. The distance is only 52 miles. The return trip will be made in time to hold the executive session in Indianapolis in the evening, which proved so enjoyable a plan at the last meeting.

A get-together dinner will be held in the Riley room in the Hotel Claypool on Monday evening.

Indianapolis being a railroad center makes it very accessible from all directions. Details as to transportation will be sent directly to the deans later. All those who are interested in medical education and teaching are cordially invited to come to the meeting.

The local arrangements for the meeting are in the hands of Drs. C. P. Emerson and B. D. Myers. Need more be said?

State Board Examinations for 1927

The results of the examinations for licensure held by the examining boards of the various states during 1927, published in the *Journal of the American Medical Association,* April 14, 1928, are very interesting. Whether they are to be accepted as evidence of the quality of teaching done in medical schools is a debatable question. However, for many years these statistics have been quoted often by many groups interested in medical education and for various purposes. Medical schools, naturally, are eager not to have any failures. Each school checks up the results for the year just passed with those of preceding years. These figures have been of significance in classifying or rating schools, and they should be considered very carefully by all schools. Will the time ever come when there will not be any failures in these examinations? Will medical schools ever be able to weed out the possible failures before the day of graduation? Quien sabe?

The results of this and previous years show that since 1923 there has been a steady falling off in the number of failures. Of the recent *graduates* of all schools represented in the examinations, 10.8 per cent failed in 1923, and only 4.2 per cent failed in 1927. The failures among all *candidates* (graduates of all years) has decreased from 14.9 per cent in 1923 to 7.1 per cent in 1927.

An analysis of the 64 schools granting the degree of M. D. who are in member-

ship in this Association shows that they were represented by 2,924 graduates of 1927. Of this number, only 41 failed, or 1.36 per cent. It is of interest that these same 64 schools had also 1,496 graduates of previous years take the 1927 examinations and that they contributed 70 failures, or 4.67 per cent. Forty-three schools had no failures at all; 6 schools had up to 2 per cent failures; 2 had from 2 to 3 per cent failures; 4 had from 3 to 4 per cent; 2 had from 4 to 5 per cent; 4, from 5 to 6 per cent; one, 6.7 per cent; one, 7.2 per cent and one, 9.7 per cent.

The 43 schools with no failures were represented by 1,657 graduates, 56.6 per cent of the total (2,924) examined. The 6 schools with failures up to 2 per cent, were represented by 486 graduates, of whom 6 failed, 1.2 per cent. Two schools, with from 2 to 3 per cent of failures, were represented by 87 graduates, of whom 2 failed, 2.4 per cent.

Four schools, with from 3 to 4 per cent failures, were represented by 243 graduates, of whom 8 failed, 3.2 per cent. Each of the four schools had two failures. Two schools, with from 4 to 5 per cent failures, were represented by 146 graduates, of whom 6 failed, 4.1 per cent. One school, with 99 graduates, had 4 failures; the other, with 47 graduates, had 2 failures.

Four schools, with from 5 to 6 per cent failures, were represented by 230 graduates, of whom 13 failed, 5.6 per cent. One school, with 88 graduates, had 5 failures; one, with 18 graduates, had 1 failure; one, with 85 graduates, had 5 failures, and one, with 39 graduates, had 2 failures.

One school, with 30 graduates, had 2 failures, 6.7 per cent. One school, with 14 graduates, had 1 failure, 7.2 per cent, and one school, with 31 graduates, had 3 failures, 9.7 per cent.

These figures cannot be otherwise than a source for congratulation, inasmuch as they show clearly that the number of failures is steadily diminishing, in spite of the fact that many elements enter into the conduct and evaluation of and examination for licensure. Some schools will, no doubt, be somewhat disappointed by these results, but, perhaps, they will serve as a stimulus to "take stock and to put the house in order."

Criticism of Medical Teaching

Criticisms of current medical training as viewed from the standpoint of the licensing boards were solicited. The outstanding criticisms are directed against the teaching in therapeutics and preventive medicine. Many of the examiners maintain that present-day medical graduates are not sufficiently familiar with methods of treatment, although frequently possessing more knowledge of the details and technic of the laboratory sciences than is necessary, in the opinion of these examiners. The complaint against the teaching of therapeutics is largely directed against that in the most common illnesses seen in practice, which are so largely exploited by the various cults. It is felt by many of the examiners that the recent graduates are not sufficiently familiar with public health activities as well as the preventive aspects of medical practice. Another criticism is directed against the tendency for specialization. The belief is expressed that the atmosphere of current medical training is largely that of specialization and that students are impressed with it too early, before they are able to secure a sufficiently broad base of training. A number of the examiners criticize the overemphasis of laboratory work in diagnosis and treatment, maintaining that there is too much of a tendency for the recent graduate to rely upon the laboratory. There is a growing feeling that this defect is traceable in considerable part to the methods of training in the hospital where, in the best interests of medical service to the patient, numerous laboratory, roentgen ray and other forms of supplementary service are employed. While of great importance in the medical care of patients, it is felt by some that these services have been over-utilized in the training of the medical student.

Relative to the criticism against the teaching of therapeutics, a number of the examiners comment on the fact that in some instances they still use for examination methods of therapeutics which have

been abandoned. Other examiners criticize themselves for not conducting their examinations in keeping with modern medical knowledge. Most of the examiners emphasize the importance of conducting examinations for medical licensure in keeping with current medical science and practice.

At the present time the state licensing boards conduct detailed examinations in the subjects of anatomy, physiology, chemistry, pharmacology and other basic sciences upon which sound medical practice is largely dependent. A few examining boards also examine in considerable detail in purely administrative and sanitary features of public health work, and in the details of advanced laboratory diagnostic methods which the average physician can not or should not be expected to do. Some believe, inasmuch as the licensing boards are concerned primarily with the qualifications of the individual to practice medicine, that the detailed examinations in technical features of the medical sciences are not necessary. Evidently the opinion is growing among state medical boards that the examinations for licensing should be confined largely to the various branches of clinical medicine, exclusive of the technical features of operative surgery and other details of specialized practice, and that examinations to test the qualifications of the individual to begin the practice of medicine should be in the nature of general comprehensive examinations, which may well include the practical application of the basic sciences in medical practice. If such an attitude is to prevail it would naturally be assumed that the state boards would concern themselves more with the educational preparation of the student and with the quality of work done by the schools in which these students take their courses.—*From the Second Report of the Commission on Medical Education.*

Undergraduate Instruction in Fractures

The General Fracture Committee of the American College of Surgeons has formulated the following propositions:

1. That each medical school devote at least a minimum amount of time,—30 hours,—for instruction in the fundamental principles of treatment of fractures. This should include (a) Careful detailed study of the pathology of fractures, involving not only the original injury to the bone and soft parts, but a careful study of the process of repair. (b) The principles of examination and diagnosis. (c) Careful first aid treatment. (d) Importance of early reduction. (e) The principles of immobilization. (f) Active and passive movements. (g) Massage. (h) Various forms of physiotherapy. (i) The principles of prognosis as based on a careful study of end results.

2. In addition to these general principles, each student should have as much opportunity of seeing and handling concrete examples of fractures as the time and clinical facilities of the school allow, in order to illustrate the application of these principles.

Dr. Charles L. Scudder, Boston, is the chairman of this committee.

College News

Indiana University School of Medicine

An educational experiment indicating the possibility of a modification of the formal standardization of the medical courses in the United States adopted about twenty years ago, is being undertaken to some degree in the Indiana University School of Medicine. An attempt is being made to parallel laboratory and clinical courses, helping students to better correlate their clinical observations with what they do for their patients in laboratory tests. Serology, such as the Wassermann reaction, and special pathology will be postponed until the senior year when students will have a better foundation of clinical observations to appreciate the work. Gross pathology will be given the sophomore year, and microscopic pathology in the junior year. Ward rounds, and other clinical work to some degree, will be started with the sophomore year. It is hoped that students will go to their patients without prejudices developed by formal study of textbook types and will be better equipped to interpret their laboratory study in the light of what they actually see manifested in their patients; rather than, as now, trying in many cases, though unconsciously, to make their patients fit ideas they have acquired in preclinical and laboratory work.

With the resignation of Dr. John F. Barnhill the sub-department of surgery entitled surgery of the head and neck including the central nervous system has been discontinued and is provided for in the department of general surgery and ear, nose and throat. With the death of Dr. John H. Oliver, head of the department of surgery, and of Dr. Orange G. Pfaff, of the department of gynecology, the department of gynecology has been made more closely a subdepartment of surgery, although with its individual organization left intact. Dr. Willis D. Gatch, professor of surgery, as previously announced, has been made head of the department of surgery.

Stanford University School of Medicine

Faculty Changes: Promotions:

Dr. William Dock, assistant professor in medicine; Drs. John Kent Lewis and Eaton M. MacKay (new appointments), instructors in medicine; Charles C. Johnson, instructor in pharmacology; Dr. Hans Barkan (ophthalmology), clinical professor in surgery and head of the division of ophthalmology; Dr. Jay Marion Read, associate clinical professor in medicine; Dr. Stuart C. Way (dermatology), assistant clinical professor in medicine; Dr. Wilbur Frank Sweet (ophthalmology), assistant clinical professor in surgery; Dr. Albert Victor Pettit, assistant clinical professor in obstetrics and gynecology; Drs. Walter Schilling (neuropsychiatry) Pleasant A. Taylor and Joseph Charles Cuneo, clinical instructors in medicine; Dr. Henry A. R. Kreutzmann (genito-urinary), clinical instructor in surgery; Dr. Lewis Michelson, clinical instructor in obstetrics and gynecology.

University of Pittsburgh School of Medicine

A gift of $750,000 has been received for the building of a free dispensary, which will be equipped with all modern facilities for teaching. The 300 bed Elizabeth Steel McGee Hospital for Obstetrics and Gynecology, which is nearby, is in affiliation, and the medical control is under the direction of the school of medicine of the University of Pittsburgh. The Tuberculosis League Hospital is also directly affiliated. The medical function of all these affiliated institutions is under the direct control of the school of medicine.

University of Texas Medical Department

Dr. George Emmett Bethel, director of the university health service, has been appointed dean. Dr. Bethel is an alumnus of the school, class of 1923. Previous

to his connection with the health service, he had been connected with the department of anatomy.

St. Louis University School of Medicine

The plans for the new University Hospital, which will eventually furnish much, if not all, of the clinical teaching facilities, hospital and outpatient, for the school, are completed. Building will be begun in the near future. The structure will occupy the square directly across the street from the college. The university owns the ground and will erect and equip the hospital.

University and Bellevue Hospital Medical College

Faculty appointments: Dr. Samuel Brock has been appointed assistant professor of neurology, and Dr. Bret Ratner has been appointed clinical professor of pediatrics.

University of Cincinnati College of Medicine

The construction of the Christian R. Holmes Hospital is now well under way. Funds amounting to $465,000 were donated by Mrs. Holmes, Mr. and Mrs. C. P. Taft and Mr. Wm. C. Proctor. The hospital will consist of four stories, providing for thirty-six private rooms and eight "two-bed" rooms, accommodating fifty-two patients, administration offices, offices for physicians and surgeons, four living rooms for internes and residents, a pharmacy, kitchen, storerooms, surgical suite and roentgen-ray and clinical laboratories. A fifth floor will provide two artificial heliotherapy rooms, a large and pleasant solarium and three open roof areas, which may be utilized for natural heliotherapy.

University of Michigan Medical School

Promotions: Dr. Frederick A. Coller from associate professor to professor of surgery; Dr. Carl E. Badgley, from assistant to associate professor of surgery, and Dr. James M. Pierce to assistant professor of obstetrics and gynecology; Malcolm H. Soule, Sc.D., from assistant professor of bacteriology to associate professor. The board of the university at this meeting also accepted two gifts of the Fellowship Corporation of Battle Creek, one of $20,000 for studying problems of metabolism, the other of $2,500 for the investigation of bran as an article of diet. Reuben L. Kahn, Sc.D., was appointed director of the laboratories of the University Hospital and assistant professor of clinical bacteriology and serology in the medical school. Dr. Charles L. Brown of Peter Bent Brigham Hospital, Boston, has been appointed assistant professor of medicine.

The trustees have authorized the establishment of a department of graduate medicine. Dr. James D. Bruce has been asked to organize it.

Howard University School of Medicine

The new $500,000 medical school building was formally opened April 9-10. The government appropriated $370,000 toward cost and equipment, the General Education Board $170,000. Sixty-three colored alumni donated $1,000 or more each toward the endowment fund.

The dean, Dr. Edward A. Balloch, whose efforts were largely responsible for securing this new building, having reached the retiring age set by the university trustees, retired in June.

University of Nebraska College of Medicine

A new unit of the University Hospital has been completed. This hospital is wholly a teaching hospital and 250 beds are now available. Other similar additions are planned for the future.

University of Alabama School of Medicine

It is reported that the university is contemplating to establish a four year medical course. An advisory council has been appointed to work up a plan. This committee consists of the dean, Dr. S. W.

Welch, state health officer, Dr. J. S. McLester, professor of medicine and the president, Dr. Denny. Full time men in major branches are contemplated with a hospital affiliated with the university devoted to the care of the sick poor, to the training of physicians and nurses and to medical research. To this end Dr. Clyde Brooks who has been dean of the medical school for many years has resigned to accept the chairmanship of a newly created committee on research. He will continue as professor of physiology. Dr. Stuart Graves, former dean of the University of Louisville Medical Department, has been appointed dean to succeed Dr. Brooks. He will also head the department of pathology.

University of Southern California College of Medicine

It was recently decided to reopen this medical school which was closed about ten years ago. The trustees have set aside $500,000 as an endowment. Plans for buildings, equipment, curriculum and faculty appointments will be announced later by a joint committee of alumni and local physicians who are not alumni. It is planned to take on a freshman class this year—so that by 1931 a full four year course will be in effect.

Members of the Los Angeles County Medical Association have already contributed $40,000 to the endowment fund of the newly organized medical school, which is to have its opening in September. The University will ask the medical profession of southern California to raise $500,000 for the endowment of this school. The average subscription is $500. All subscriptions are payable over a period of five years. An entirely new faculty is to be appointed. For the time being it is planned to offer instruction at the University, using present buildings and equipment. Later it is proposed to enter into a working arrangement with local hospitals for the teaching of the clinical years.

Yale Medical School

A new curriculum has been adopted which gives the student liberty in accordance with his ability and makes the institution practically an honor school. Dean Winternitz says that for years an objective of the faculty has been to discriminate less between the prospective student candidates for the degree of doctor of medicine and that of doctor of philosophy in various biologic sciences. Without reducing the number, he believes, this procedure will produce better trained physicians and contribute to the movement in preventive medicine. Several hundred students in the Graduate School of Yale University are devoting themselves to one or another branch of biology with the idea of becoming teachers and investigators. As time has gone on, they not infrequently have concluded, after one or more years of training in some field of biology, to prepare themselves for the practice of medicine and, to allow this interchange, a greater elasticity between the graduate school and the school of medicine has developed. The Yale school of medicine occupies a unique position in this regard, as no line of cleavage for the university departments occurs, irrespective of the schools they serve. Candidates for a doctor of philosophy and those for a doctor of medicine find themselves in the same building and taught by the same instructors. Experience, the dean continues, has indicated the inadvisability of inelastic stratification of the curriculum for men of this type, so the medical school has introduced the same liberal educational policies for candidates for a doctor of medicine as were introduced years ago in the graduate school for candidates for a doctor of philosophy. The school of medicine now prefers to admit students primarily on account of their interest in the biologic sciences rather than on a preconceived idea of becoming doctors of medicine. The student selects the courses in biology which he desires to pursue and for which the instructor considers he is prepared. Later he concludes whether he will make a more successful doctor of philosophy or a doctor of medicine, and then presents himself for qualification. This is the first examination required of him, and it may be in less than a year and a half after admission to the school or twice as long. Students are not grouped by classes. The

student, during the preliminary period, regards his instructor as a co-worker. After the completion of the first test and having determined on his career, he proceeds further with his education according to the same liberal principle and appears again for examination before graduation, after having completed the fundamental courses and having had his thesis accepted. The fundamental courses at Yale have been reduced to a minimum. The student has practically half his time for elective study; he is not taught, but assisted in acquiring knowledge. The class rooms are in many instances designed so that the student is considered practically a member of the staff. A fundamental point of this system is the complete liberty of the student to acquire the knowledge he requires for the completion of his qualification examination or graduation. If he feels a subject may be pursued more efficiently at another institution, at home or abroad, it is his privilege to take advantage of his conclusion, for all that is required of him is the demonstration of knowledge in the subject; grades and hours of work are not even recorded in the administrative office.—NEWS ITEM, *J. A. M. A.*, (March 3, 1928.)

[NOTE.—This plan was described fully in a paper read by Dr. Winternitz at the 1926 (Cleveland) meeting of the Association and published in the BULLETIN, July, 1927, p. 208.—Ed.]

PROMOTIONS

William Arthur La Field to clinical professor of radiology; Joseph I. Linde to professor of pediatrics; Donald W. Porter to professor of pediatrics; Theodore S. Moise to associate professor of surgery; Arthur M. Yudkin to associate professor of ophthalmology; Leon S. Stone to associate professor of anatomy; Ira V. Hiscock to associate professor of public health; John W. Hammond to assistant professor of pediatrics; Daniel C. Darrow to assistant professor of pediatrics; James Charles Fox, Jr., to assistant professor of medicine; William Charles McGuire to assistant professor of neurology; Harold Myes Marvin to assistant professor of medicine; Allen King Poole to assistant professor of medicine.

University of California Medical School

Faculty appointments: Chauncey D. Leake, Ph.D., professor of pharmacology in the medical school, and Dr. Alfred C. Reed, professor of tropical medicine in the George Williams Hooper Foundation for Medical Research; R. W. Burlingame, M. D., instructor in medicine; W. Simpson, Ph. D., instructor in physiology; Robert S. Stone, M. D., instructor in roentgenology; Allen Owen, M. D., instructor in obstetrics and gynecology.

Promotions: Glanville Y. Rusk from associate professor of pathology to professor of pathology; Olga Bridgman from associate professor of pediatrics and psycology to professor of pediatrics and psychology; Herbert W. Allen from associate clinical professor of medicine to clinical professor of medicine; Florence M. Holsclaw from assistant clinical professor of pediatrics to associate clinical professor of pediatrics; David M. Greenburg from instructor in biochemistry to assistant professor of biochemistry; Leopold R. Cerecedo from instructor in biochemistry to assistant professor of biochemistry; Robert Emmet Allen from instructor in medicine to assistant professor of medicine; Jean Walker Macfarlane from instructor in psychology and pediatrics to assistant professor of psychology and pediatrics. Frederick C. Cordes from instructor in ophthalmology to assistant clinical professor of ophthalmology; Ralph Robinowitz from instructor in medicine to assistant clinical professor of medicine; Howard W. Fleming from instructor in surgery to assistant clinical professor of surgery; Edwin L. Bruck from instructor in medicine to assistant clinical professor of medicine; George K. Rhodes from instructor in surgery to assistant clinical professor of surgery; Curle L. Callander from instructor in surgery and topographical anatomy to assistant clinical professor of surgery and topographical anatomy; Sidney J. Shipman from instructor in medicine to assistant clinical professor of medicine; Robert S. Sherman from assistant in surgery to instructor in surgery; Norman N. Epstein from assistant in dermatology to instructor in derma-

tology; George N. Hosford from assistant in ophthalmology to instructor in ophthalmology; T. Eric Reynolds from assistant in pharmacology to instructor in pharmacology; Theodore L. Althausen from assistant in medicine to instructor in medicine; A. Lincoln Brown from assistant in surgery to instructor in surgery; Milton I. Rose from assistant in physiology to instructor in physiology; Dorhmann C. Pischell from assistant in ophthalmology to instructor in ophthalmology; Benjamin L. Freedlander from assistant in medicine to instructor in medicine.

Resignations: Rudolf Gahl as assistant professor of biochemistry and bacteriology.

Columbia University Presbyterian Hospital

Six units of this development are now open: Presbyterian Hospital; Sloane Hospital for Women; Squier Urological Clinic; Presbyterian Hospital School of Nursing Practice; Harkins Pavilion and Anna C. Maxwell Hall for Nurses. The College of Physicians and Surgeons will move to the Center this summer.

Advances in the salaries of teachers and administrative officers have been announced. The new schedule, it is reported, provides a minimum salary of $7,500 a year for full professors, an increase from $6,000; for associate professors, a minimum of $5,000 in place of $4,500, and for assistant professors, a minimum of $3,600 instead of $2,400. There will be also salaries of from $9,000 to $12,000 for individual professors of exceptional service or distinction, and a salary of $6,000 for the associate professors.

University of Chicago

Promotions: Paul C. Hodges to professor of roentgenology; Robert G. Bloch to assistant clinical professor of medicine for three months; Siegfried Maurer to assistant professorship of pathology under the Otho S. A. Sprague Institute.

Appointments: Fred C. Koch, chairman of department of physiologic chemistry and pharmacology; Charles S. Capp, assistant professor of roentgenology in the department of medicine; Eustace L. Benjamin, instructor in the department of pathology under the Otho S. A. Sprague Institute; Harry L. Huber, clinical instructor in the department of medicine; Eloise Parsons, instructor in the department of medicine of the Ogden Graduate School of Science and instructor in the department of surgery, under the Douglas Smith Foundation; Evans W. Pernokis, clinical associate in the department of medicine in Rush Medical College; P. D. Ward, assistant director of the Albert Merritt Billings Hospital.

Meharry Medical College

The Royal College of Physicians of London and the Royal College of Surgeons of England have, on the recommendation of the Committee of Management of this Board, decided to add the Meharry Medical College, Nashville, Tennessee, to the list of institutions whose graduates are admissible to the final examination of this Board under the conditions of paragraph IV, Section III, of the regulations in force before the 1st of January, 1923, and under paragraph III, Chapter III, of the regulations applicable to candidates who began their medical study after that date.

University of Arkansas School of Medicine

Dr. James I. Scarborough has been appointed head of the department of surgery. He has just completed a two years course of study in the Mayo Clinic.

Washington University School of Medicine

A gift of $750,000 has been received with which the capacity of its surgical department and that of Barnes Hospital, with which the school is affiliated, will be doubled and its teaching facilities made comparable to those of the great European institutions. Frank C. Rand and Jackson Johnson of the International Shoe Company, and trustees of the university (Mr. Rand is also chairman of the board of trustees of Barnes Hospital) each gave $150,000 for a three

story addition to the present surgical pavilion, and the General Education Board, New York, gave $450,000 to be used for teaching and research in the surgical department, which with the addition, will have 200 surgical beds.

Medical College of Virginia

The survey report on higher education in Virginia recently submitted to the governor includes these recommendations among others in specific relation to the Medical College of Virginia, Richmond: that funds be provided to increase salaries approximately twenty per cent, to make possible more ample extension service, to supply a new laboratory for chemistry, pathology, and bacteriology and a building for clinical dentistry, and to develop research more generously. It also recommends that the college take over the state public health laboratory as now maintained by the State Board of Health and that the school of nursing be developed more generously on the side of pediatrics and obstetrics to make possible more affiliations in these subjects with the smaller hospitals in the State. There are other recommendations of a more general character.

Resources of General Education Board

In the annual report of the General Education Board, New York, is the following paragraph on resources:

At the highest point, the principal funds of the General Education Board contributed by Mr. Rockefeller amounted to $131,000,000. While these funds were all usable, in the discretion of the trustees, for any of the purposes enumerated in the charter, it is only fair to say the sum of $50,000,000 was given at a critical moment in the expectation that it would be used—principal and interest—in cooperation with colleges and universities to raise endowments, the income of which would be devoted to the increase of salaries; and that the sum of $46,000,000 was given in the expectation that it would be used—principal as well as income—in the field of medical education. The salary fund appropriations have been completed; of the medical fund, $35,000,000 has been pledged. In addition, a reserve fund, amounting to $4,000,000, has been disposed of—almost wholly in the field of medical education. The board now holds approximately $50,000,000, of which $10,000,000 will probably be devoted to medicine. Meanwhile, as pledges amounting to $48,000,000 are still unpaid or partly paid, the total annual income of the board is approximately $6,000,000; but as these pledges are paid, the annual income of the General Education Board will be reduced.

At the level at which the board is now operating, effective work cannot be done with income alone. The board has therefore not hesitated to make appropriations from principal when the objects to be accomplished have seemed of sufficient importance to justify such action.

The medical schools in the United States which have been assisted in programs of expansion or improvement by the General Education Board are: Columbia University, Cornell University Medical College and New York Hospital, Johns Hopkins University, University of Chicago, University of Oregon, University of Virginia, Vanderbilt University, Washington University, Western Reserve University and Yale University.

Chinese Medical Schools

The *Medical Guide* of the National Medical Association of China published in February, 1928, gives a list of thirty-six medical colleges now operating in China. According to this publication the Medical Department of the National University of Peking has granted a total of 293 medical degrees during the years 1917 to 1926, inclusive. The Peking Union Medical College reported 78 regular students enrolled at the beginning of the school year 1927-1928. During the year 1926—1927, 92 special and graduate students, including 56 Chinese students, were enrolled. The capacity of each class of the medical school is approximately 25. There are now 119 holders of de-

grees from Peking Union Medical College. During the academic year 1925-1926, there were 55 students enrolled in the Hackett Medical College for Women at Canton and from 1903 to 1924, inclusive, 147 medical degrees have been granted. The School of Medicine of Shantung Christian University reports a total of 98 students enrolled for the year 1924-1925, of whom 9 were graduated in January, 1925.

The Bonfils Foundation

Mr. Frederick G. Bonfils, publisher of the Denver *Post*, has set aside $500,000 to establish a foundation, which will offer $250,000 as a reward for a cure of tuberculosis and $250,000 as a reward for a cure of cancer.

Fellowships in Psychiatry

The Colorado Psychopathic Hospital, University of Colorado, has been awarded Commonwealth Fund fellowships for the purpose of stimulating men to enter the field of psychiatry and to afford them fundamental training. These fellowships are awarded for two year periods—three beginning July, 1928, three beginning July, 1929, and so on to 1931. The first twelve months are to be spent in the fundamental training of psychiatry; the second twelve months in a continuation of this work with additional work in teaching, and outpatient and traveling clinics. There will also be opportunity for research and elective work. The fellowships are adequately financed.

Lengthening of the German Medical Course

Beginning with June 1, 1928, the premedical course will comprise five instead of four semesters, and the complete medical course will thus cover eleven in place of ten semesters. After that date, only students who have studied medicine for eleven semesters, at least five of which must have followed the passing of the premedical examination, will be admitted to the final medical examination. After eleven semesters' medical study, the medical examination must be taken.—News Letter, *J. A. M. A.*, (March 24, 1915).

New York Clinics

The Consolidated Directory of Social Agencies, published by the Charity Organization Society and the Welfare Council of New York and twenty other groups of social agencies, show that there are 1,161 clinics in New York. Of these, 340 are in Manhattan and the Bronx, 299 in Brooklyn and Queens, and twenty-two on Staten Island. There are ninety-one general hospitals and eighty-five special hospitals represented. In addition to the clinics, there are 426 agencies and institutions engaged in health work. There are 439 organizations engaged in family welfare, 380 organizations in child welfare, and 367 agencies and 1,474 churches under the council's classification of recreation, education and neighborhood activities. The new directory incorporates all social agencies according to their functions, and gives a brief statement concerning the nature of service each is equipped to render. The directory indicates that New York has the largest and most efficient welfare machinery in the world, and that it is the nation's capital for such endeavor, 280 national health and welfare organizations having headquarters there.

Physicians in Siam

A recent report states that the number of registered and certified medical practitioners in Siam at the end of 1927 was about 500. The population of the country is 9,831,000, and the area is 206,000 square miles, making a ratio of about five physicians for each 100,000 population and two physicians to each 1,000 square miles. Besides the registered physicians, there are a certain number of assistant physicians and also a class of old-time "doctors" and healers, who, without modern training, treat patients according to tradition and experience.—*Federation Bulletin*, April, 1928.

Ban British Women Students from London Hospitals

According to a report, a ban has recently been placed on the acceptance of further women students at five of the

largest London hospitals following the protest of men students, who object to women students on the following grounds: The two sexes cannot mingle in the study of medicine; the women interfere with athletics; they distract the men from their studies, and women are not successes as doctors. The hospitals concerned are King's College, Westminster, Charing Cross, London and St. George's. The women's organizations have declined to accept the men's victory as permanent and are said to threaten dramatic counter moves.—*Federation Bulletin,* April, 1928.

Basic Science Boards and Enforcement

The reports regarding applicants examined by basic science boards during 1927 show some interesting data. Of the 474 candidates examined, 452, or 95 per cent, were physicians, leaving only twenty-two candidates for the testing of whom these boards were supposedly established. Of the twenty-two irregular practitioners examined, only seven failed. It is a question, however, whether all irregular practitioners entering these states actually appeared before basic science boards. No doubt some of these practitioners have opened offices, irrespective of basic science or any other licensing boards. The establishing of basic science boards, therefore, should not detract attention from the first essential in medical licensure; namely, a vigorous enforcement of medical practice laws. Enforcement is the most essential point, since laws in most states are already adequate. Any law is useless unless provision is made for vigorous enforcement.—*J. A. M. A.,* April 14, 1928.

PERSONALS

Dr. Wilder G. Penfield, assistant professor of surgery, Columbia University College of Physicians and Surgeons, has been appointed professor of neurologic surgery at McGill University Faculty of Medicine.

March 7, 1928, Tulane University of Louisiana conferred an honorary degree of LL.D. on Dr. Aristides Agramonte, of Havana, Cuba, in recognition especially of his large contribution to human health and welfare as a member of the immortal commission consisting of Reed, Carroll, Agramonte and Lazear, who first discovered and proved the transmission of yellow fever by mosquitoes.

Dr. T. L. Patterson, professor of physiology at the Detroit College of Medicine, has been appointed acting professor of physiology for the summer quarter at Stanford University.

Dr. Henry C. Hartman has resigned as dean and professor of pathology in the University of Texas School of Medicine.

Dr. George T. Pack, professor and head of the department of pathology in the School of Medicine of the University of Alabama, has resigned to accept an appointment in the Memorial Hospital for Malignant Diseases of New York.

Dr. Stuart Graves of Louisville, formerly dean of the Medical School of the University of Louisville, has been appointed dean of the School of Medicine of the University of Alabama and professor of pathology.

Dr. Clyde Brooks, formerly dean of the School of Medicine of the University of Alabama, has been appointed chairman of a newly created faculty committee on research.

Dr. Solomon Katzenellenbogen, former chief resident physician at the Hospital Canton, Geneva, Switzerland, has been appointed associate professor of psychiatry in Johns Hopkins University School of Medicine. He will also have charge of the department of internal medicine in the Phipps Clinic.

Dr. Arthur L. Tatum, of the University of Chicago, has been appointed professor of pharmacology at the University of Wisconsin Medical School.

Dr. Lee Wallace Dean, formerly dean and professor of otolaryngology and oral

surgery of the State University of Iowa College of Medicine, Iowa City, has been appointed full-time professor of otolaryngology at Washington University Medical School, St. Louis, where he will assume his duties at once.

After about ten years' service as dean of Cornell University Medical College, Dr. Walter L. Niles has resigned to become a member of the Joint Administrative Board of Cornell's new medical center which will be erected in conjunction with New York Hospital.

Dr. Ray Lyman Wilbur, president of Stanford University, delivered an address at the dedication of the site of the $5,000,000 educational institution to be erected in the Del Rey Hills, near Los Angeles, by the Lutheran Church.

Dr. Ernst L. Walker, professor of tropical medicine in the University of California Medical School, has returned from Honolulu where he made studies of leprosy for the U. S. Public Health Service.

Dr. Alfred C. Reed, formerly of the Stanford University School of Medicine, has been appointed professor of tropical medicine in the University of California Hooper Foundation for Medical Research. Dr. Reed is now studying at the London School of Tropical Medicine. He will assume his new duties in February, 1929.

Dr. Francis D. Coman, of Johns Hopkins Hospital, will accompany Commander Byrd to the South Pole. He will act as medical officer of the expedition and represent Johns Hopkins University Medical School.

Dr. George R. Albertson, professor of anatomy in the medical school of the University of South Dakota, has been appointed dean to succeed the late Christian P. Lommen. Dr. Albertson has functioned as acting dean for the past two years.

Dr. E. V. Cowdry, of the Rockefeller Institute for Medical Research, has been appointed professor of cytology in the department of anatomy of Washington University, St. Louis.

Professor J. J. R. McLeod, associate dean of the Faculty of Medicine, University of Toronto, has accepted the Regius professorship in physiology at the University of Aberdeen, Scotland.

Dr. Thurman D. Kitchin, dean of Wake Forest College School of Medicine, was elected president of the North Carolina State Medical Society at its seventy-fifth annual meeting held in May.

Mr. Abraham Flexner resigned as secretary of the General Education Board in May.

Dr. Ralph A. Fenton and Olof Larsell, Ph.D., of the University of Oregon Medical School, Portland, were awarded the Casselberry prize of $500 by the American Laryngological Association in session in Washington, D. C., May 2, for work on the pathway of pain referred to the ear in nose and throat diseases.

Robert Chambers, Jr., Ph.D., professor of miscroscopic anatomy, Cornell University Medical College, has been appointed by New York University to be chairman of the department of biology and research professor of biology at its Washington Square College.

Dr. Michael A. Iogolevitch, formerly professor of neurology and psychiatry in Petrograd, has been appointed lecturer in the department of neurology at the New York Polyclinic Medical School and Hospital.

Dr. Harvey J. Howard has been appointed full-time professor of ophthalmology and Jacques J. Bronfenbrenner, Dr. P. H., has been appointed professor and head of the department of bacteriology and immunology in the Washington University Medical School.

Dr. John Warton Harris, associate professor of obstetrics, Johns Hopkins University School of Medicine, Baltimore, has been appointed professor of obstetrics and gynecology at the University of Wisconsin Medical School, Madison.

Abstracts of Current Literature

Application of Pathology to Surgical Problems

Although pathologic opinion in individual cases is often the most important which the patient receives in the hospital and is therefore a necessity for efficient treatment, a far more important function of the pathologist is his ability to teach. Every man who practices medicine in any of its branches needs a sound training in pathology, but none more so than the surgeon. It is therefore a surgical problem to see that the supply of pathologists is kept up. So far as our influence on medical faculties and hospital boards goes, we should advocate adequate budgets for the pathological departments, and reiterate that the supposed advances in surgery of recent years are largely due to the pathologists and that our own daily work would be less effective if we had not had training in pathology. I think we older men can also do something in advising our assistants that a year or two in a laboratory where gross pathology can be studied and correlated with the histology will surely make a better surgeon. We surgeons must also accent our demand for a clinical tissue pathologist as opposed to one from the widening subdivisions of pathology which are now engaging attention, as serology, immunology, etc. If one looks over the journals of pathology, few articles on gross or minute pathology are seen. Practically the tissue pathologist is disappearing and it is a very important problem for surgeons to make an attractive place for him. Perhaps the answer will be to isolate the bulk of the surgery of malignant disease into a specialty and let the surgeons do their own microscopy.—CODMAN, E. A.: *New England J. Med.*, 198: 332 (April 5) 1928.

Modern Preceptorships

In the endeavor to improve medical education in this country, its control has passed from the medical profession to the universities, from an emphasis on art to an emphasis on science. The science is essential as a basis for the art. Fundamental training in the science can be well given only at the universities. The art cannot, however, be well taught if the teachers of science at the university do not work in cooperation with and have the hearty cooperation of those who are actively practicing medicine as an art. To the degree that the universities now in charge of medical education fail to seek such cooperation, they are likely to fail in teaching the art. So far as the organized profession fails to give its cooperation in every practical way, it is remiss in one of its most time honored obligations. The problem of active cooperation between pedagogue and practitioner in teaching the art of medicine is far from simple. The family practitioner has been, is now, and promises to continue to be the most important agent in applying medical science to individual needs. It has recently been estimated that a good general practitioner is capable of handling 90 per cent of the illness for which patients seek medical advice. To be a competent family practitioner, however, a man must be trained not only to recognize and treat the diseases that fall within this group but also to recognize the diseases that fall without this group and to know where to seek proper aid for patients suffering from them. While recognizing that the percentages given are merely rough approximations, it might be said that the general practitioner can at best be only a 90 per cent independent under present conditions and at the same time be competent. To be competent to treat the 90 per cent of illness coming within the range of general practice, the student must first of all be given such a training in the principles of the fundamental sciences on which medicine is based as to give him a scientific background on which to base his art. This scientific background should not be a static one but a dynamic one capable of growth. For this scientific training we must depend on specialists in science. In the medical school, however, we should expect the teachers in the preclinical

branches in courses intended to prepare men for general practice to present the various sciences not as highly technical isolated sciences but as parts of an all round knowledge of the anatomy, physiology, pathology and hygiene of man. The basal training in clinical medicine must also be given largely from the scientific standpoint of general principles. For this we must depend mainly on specialists in clinical teaching, with time and facilities lacking to those active in general practice. Such specialists should, however, present their subjects as parts of, not as apart from, clinical medicine as a whole. They must keep in active touch with preclinical science on the one hand, and on the other hand with the art of applying scientific knowledge to the diagnosis, treatment and prevention of disease. In the training of students in the art of medicine, close association of student and teacher is essential. The student learns to diagnose by being made responsible for making diagnoses, to treat disease by being made responsible for the care of patients, to command the respect and confidence of the sick by the opportunity to earn it. The more responsibility the student is given, the closer must be his association with the teacher. This close association is essential for the student that he may learn by accurate observation of example. It is essential for the teacher, because the responsibility for the patient which he transfers to the student does not lessen his own clinical responsibility but rather increases it. The main problem in medical education from the standpoint of the practice of medicine comes at the period when the student is beginning to assume clinical responsibility. It is the problem of adequate opportunity and competent supervision. In our present medical curriculum it comes in the fourth year of the medical course, preceding the intern year. The best methods of meeting the need of the personal equation in clinical education will doubtless vary with the institution. At Wisconsin the first step in this direction was to individualize the fourth year of the medical course by omitting all class work. The first year of the course is devoted essentially to anatomy and physiology, the second year to pathology and hygiene, the third to the elements of clinical medicine. By considering class work into the first three years of a four year medical curriculum, the fourth year of the course is left free for individual work under supervision. The fourth year extends from the end of the third year until graduation the following June and comprises forty-eight weeks divided into four quarters of twelve weeks each period. The class is divided into four sections, and different work is assigned to the members of each section. During the year, however, the students in each section complete essentially the same work. Only one or two students work at a given time under a given instructor. In this way close personal relations are established, and the student can be allowed considerable responsibility because the instructor has the work of only one of two to supervise. Of the four quarters, this year as last, one is called a medical quarter, one a surgical quarter, one a general quarter, and one a preceptorial quarter. During the medical quarter each student spends six weeks in the wards of the Wisconsin General Hospital under the supervision of a member of the medical staff, three weeks at the Mendota State Hospital for the Insane, and three weeks at the Children's Hospital and at a dermatologic clinic in Milwaukee. During the surgical quarter each student takes work under the supervision of the surgical staff at Madison in general surgery and in the surgical specialties. During the general quarter each student spends from two to three weeks in the obstetric service of the Chicago Lying-In Hospital, two weeks in studying methods of public hygiene under the auspices of the state and city health departments, two weeks in making physical examinations of students entering the University of Wisconsin, and the remainder of the time in elective work. It is planned next year to establish a second preceptorial quarter in place of this general quarter and to distribute the work of the general quarter among the other quarters. During the preceptorial quarter, a student elects work under the general supervision of an approved preceptor who is in a position to provide the stu-

dent with suitable hospital, laboratory and library facilities for effective work on his service and that of his associates. The supervising preceptor may select such associates and assistant preceptors as he believes will add to the welfare of the student during his service with him. The establishment of this preceptorial service has led to the organization of teaching centers in various parts of the state for cooperation with the medical school of the state university. There are at present more extensive facilities of promise for the preceptorial work than students to accommodate. A selection in establishing associate teaching centers has had to be made. In making the choice the reputation of the clinical centers selected for proficiency and idealism in medical practice, by the willingness of the leaders at these centers to cooperate in the work, and by the personal desires of the students entering on the service have been guides. Bardeen is certain that there are other centers than those chosen equally capable of offering good training to the students, and an extension in the number of such centers is anticipated as the work grows. Thus far students have worked at eight different associate teaching centers, all situated in cities of between 6,000 and 30,000 inhabitants. The men invited to organize associate teaching centers of this type are called the preceptors in charge. This preceptor is made responsible for arranging the work of the student assigned to him for the quarter. Since only one or two students are as a rule sent at a time to an associate teaching clinic and several associate preceptors are available for each student, the supervision of the students' work may be organized in such a way as not to constitute a burden on any member of the group. During the period covered, the clinical apprentice will be expected to pay more attention to opportunity than to hours. He is expected to attend staff meetings and to avail himself of other similar opportunities to broaden his knowledge of medicine.—Bardeen, C. R., *J. A. M. A.*, April 14, 1928.

Cooperation in Medical Education and Medical Service

The changes that have taken place in medical education in America in the last twenty-five years, the result of the effort made by the organized profession of this country, the American Medical Association, to elevate the standards of medical education and place it on a thoroughly sound and satisfactory basis, and also of the Council of Medical Education and Hospitals since its creation in 1904, are reviewed by Bevan. He says: The fight for higher standards of medical education has been won. It has been won by the united efforts of the American Medical Association, the Federation of State Medical Licensing Boards, the Association of American Medical Colleges, the American universities and colleges, the great educational foundations, the Carnegie Foundation for the Advancement of Teaching, the Rockefeller Foundation and the General Education Board. This great educational advance, the greatest that has occurred in any field of education in the last twenty-five years, is a wonderful example of what can be accomplished by the right sort of cooperation of the forces vitally involved in a great problem; but there remains much to be accomplished, and this must be accomplished by securing the same sort of cooperation in the future development of medical education. In order to secure, therefore, the best medical education and the best medical practice, both preventive and curative, it is necessary to secure the support and cooperation of the medical profession, of the universities, and of the community in bringing about such a result. Medical education cannot be left safely in the hands of the medical profession alone. Medical education has been turned over by the great reorganization of the last twenty years largely to the universities; and we all feel that this is the best solution. But it is very evident that the medical school cannot be safely left in the hands of the universities alone; something more is needed. Uprooted from the medical profession, uprooted from the community and transplanted to the scientifically prepared soil of the university campus, the medical school will lack those

things which the medical profession and the community alone can give. What is the right solution of our problem? It is very simple. The great function of medicine can be developed in the best way only by the cooperation of all the factors involved, the community, the medical profession and the university. Our real problem of the next ten years is to bring about this cooperation. We must not permit a line of cleavage, a schism, to develop between the medical profession and the medical teachers in our university schools of medicine. There is already danger of this. They must work together for a common purpose. We must not allow our universities to build and conduct hospitals for the primary purpose of teaching medicine. We must bring about a situation wherein the communities will build and conduct hospitals for the proper care of the sick, and the best of these will be used as teaching hospitals. No hospital should ever be built unless its primary purpose and function is to care for the sick. We should attempt to secure such cooperation between the university and our great hospitals and the medical profession that, working in harmony and together, they will build up at each university medical school a great medical center consisting of a group of hospitals, a great general hospital, special hospitals and dispensaries, public health and infant welfare work; a great medical school plant with laboratory and research and teaching facilities for the purpose of doing at least three things. 1. Securing for the people the great possibilities of modern scientific medicine. 2. The teaching of medicine. 3. Medical research. In building up such a great medical center each one of the three vitally interested and essential factors must do its part. The university should furnish the location; such a great medical center is best grouped around a university. The university should also furnish the medical school plant and research laboratories and the medical faculty engaged in the work of the laboratory sciences of anatomy, physiology, pharmacology and pathology. The community should build and maintain the great group of hospitals and dispensaries and conduct them primarily for the purpose of providing the best medical and surgical care for the patients that enter their doors. The medical profession should provide the attending medical staff for these hospitals and dispensaries. These attending men should be the leaders of the medical profession in their special fields. They should be nominated by the university and be university professors; and they should carry on three functions: 1. Clinicians taking care of the sick. 2. Teachers of medicine. 3. Research workers. It is of great importance that these clinical teachers retain their normal relations to the community and the medical profession and retain their full freedom to serve as great consultants and as great specialists in their special fields. The medical educator who sees the future of medical education as a purely university affair, with its clinical teaching conducted in a university-owned hospital, heavily endowed and filled only with charity patients, and officered by full-time salaried men, with the hospital with its patients and the laboratory with its frogs and guinea-pigs, conducted along the same scientific university ideal lines without any contact with the medical profession and the community, surely has no vision and no place in the future development of medical education in this country.—BEVAN, A. D.: *J. A. M. A.*, April 14, 1928.

Medical Education in Great Britain and Ireland

Sir Norman Walker, Edinburgh (*J. A. M. A.*, April 14, 1928), reviews briefly the history of medical education in Great Britain, and then discusses the education of physicians, especially in Scotland and in Edinburgh. He says: The most important thing in the education of a really good doctor is his general education. There are various ways of testing this. Most of our universities accept certificates which would admit candidates to other universities, at home, in the British Empire overseas, in India, Egypt, France, other European countries and the United States of America. Of these last we accept any university or

college on the list of colleges and universities approved by the Association of American Universities. The majority of Scottish students enter our universities with the credit of the leaving certificate of the Scottish Education Department, which is a combined certificate of education and examination. If candidates have none of the preceding qualifications they must undergo a special preliminary examination, which is held conjointly by the four Scottish universities and which must include English, mathematics or physical science and one or more languages; of these subjects, two must be passed on the higher standard, provided Latin (or Greek) or mathematics is one of them; if not, the candidate must obtain three higher certificates. In physics, chemistry and biology, the fundamental approach is the same, namely, an introduction to the elements and principles in the secondary school, and the exposition of the medical aspects, meaning and purpose in the university. Students who have passed the preregistration examination should sit the first professional in chemistry, physics, botany and zoology at the end of their third term (one year). During this year they have also been engaged in the study of anatomy and histology, and at the end of their sixth term comes the examination in anatomy and physiology, the students' time for one year having been entirely devoted to these two subjects. The third year is devoted mainly to pathology, bacteriology and clinical therapeutics. There is a junior course of lectures in medicine (one term), and an introductory course in clinical surgery and allied subjects (one term). The examination in pathology, materia medica and therapeutics is held at the end of the ninth term. In the fourth and fifth years the students are divided into three sections. Section A is the medicine group and its time is devoted to clinical medicine and infectious diseases. Section B (surgery) works at clinical surgery, anesthetics and dispensary practice, a centuries' old feature of Edinburgh teaching. Section C is the special subjects group which includes diseases of the eye, ear, nose and throat, and skin. The students' clinical time is devoted to these during one term. During the tenth term all the sections attend a midwifery lecture demonstration daily from 9 to 10 and spend the rest of the day at clinical work. During the eleventh term all sections attend lecture demonstrations on senior medicine, gynecology and mental diseases, and during the twelfth term the subjects of the lecture demonstrations are public health, forensic medicine and senior surgery. The examination in public health and forensic medicine comes at the end of the fourth year. During the fifth year the group system is continued. The midwifery group works at clinical midwifery, clinical gynecology and diseases of children; the medical group at clinical medicine, tuberculosis and dispensary practice; the surgery group at clinical surgery, operative surgery and venereal diseases. During the fourteenth term all sections attend a course of lectures in applied anatomy and another in venereal diseases. The last term is entirely devoted to hospital work and is followed by the final examination in medicine, surgery and midwifery. The final examinations extend over several days and include written, clinical, practical and oral examinations in each of the three qualifying subjects. As regards education, the principle sanctioned by the legislature is laid down by the Royal Commission of 1882. "It would be a mistake to introduce absolute uniformity into medical education. One great merit of the present system, so far as teaching is concerned, lies in the elasticity which is produced by the variety and number of educational bodies. Being anxious not in any way to diminish the interest which the teaching bodies now take in medical education, or to lessen their responsibility in that respect, we desire to leave them as much initiative as possible. In certain matters of general importance, such as the duration of study, and the age at which a student should be permitted to practice, common regulations ought, we think, to be laid down; but we wish to record our opinion that nothing should be done to weaken the individuality of the universities and corporations, or to check emulation between the teaching institutions of the country."

Teaching of Medical Parasitology

The present trend in medical education in the United States favors a reduction in the number of detailed facts presented to the student. At the same time, some subjects have been demanding a more prominent place in the medical curriculum. One of these is parasitology. A competent teacher of parasitology must be one who has had a thorough training in invertebrate zoology, and is therefore not likely to be one who has had the time to study and practice medicine. But unless a zoologist has had a medical training it is difficult for him to present the clinical point of view, which is necessary to make parasitology of practical value to the student, in the limited time which can be allotted to it in the medical curriculum.

A solution of this difficulty is to be found in the employment of both a zoologist and a clinician in teaching a course in medical parasitology. The subject leads itself admirably to such a cooperative effort. Granting the possibility of providing cooperation, the question arises as to the most suitable place for the course in the medical curriculum. If parasitology is taught purely as a preclinical subject, the student is likely to forget important facts concerning the parasites by the time he sees the clinical conditions produced by them. If, however, the course is placed somewhat later in the curriculum, it can be made a course on *parasite diseases*, studying not only the parasites themselves as the causes of disease, but considering also the diseases as clinical entities, together with their treatment and prophylaxis. Such a course can appropriately be given during the third year, and requires from seventy-five to a hundred hours for satisfactory presentation. This should not be considered as a direct addition of so many hours to the curriculum, but rather as a rearrangement of the hours already devoted to the presentation of parasite diseases, in the courses on clinical pathology and clinical medicine, with a reasonable addition commensurate with the importance of the subject.

At the Peking Union Medical College, the course is given during the third trimester of the third year, as the terminal portion of a course on communicable diseases, which runs through the whole year. The course occupies ninety-nine hours, including twenty-two three-hour periods, eleven two-hour periods and eleven one-hour periods. The natural divisions of medical parasitology are preserved, medical entomology, helminthology and protozoology being taken up in the order named. As each parasite is studied, the disease which it produces is considered, including its pathologic, clinical and preventive aspects. In the entomologic work, the preventive aspects are emphasized especially. Clinical cases of parasitic diseases are used as much as possible. Parasites of the lower animals are introduced only when they assist in simplifying the study of human parasites. Special emphasis is laid on microscopic liagnosis.—H. E. MELENEY, *J. A. M. A.*, April 14, 1928.

Use of Outpatient Department in Medical Teaching

The importance of stressing teaching in and from the outpatient department is emphasized by Irving S. Cutter (*Journal A. M. A.*, March 24, 1928). The outpatient department, well manned with teaching personnel, adequately equipped and supervised, constitutes by far the most important factor in the teaching of clinical medicine to undergraduate students. Seventy-five per cent of all undergraduate teaching in medicine can and possibly should be done in the outpatient department. Personnel: (*a*) It requires far greater skill, training and real thinking power to make a diagnosis and outline the management of a case in the outpatient department than in the hospital where the house officer, the intern and the nurse have all recorded significant data as to the history and the physical and clinical pathologic manifestations before the arrival of the clinician. (*b*) Therefore, to place outpatient cases in charge of young, untrained clinical assistants and instructors defeats the plan and constitutes a ruthless waste of most valuable teaching material. (*c*) Instructors of professorial rank should be in charge of each clinic each day, serving

not only more acceptably to patients and students but as teachers of junior clinicians. (*d*) There should be enough instructors in each clinic so that patients are not given perfunctory consideration but are handled as thoroughly and as expeditiously as private patients in a well managed office. (*e*) Arrangement of personnel should be such that there will be a chief of clinic each day in each department to whom all questions of diagnosis may be referred, and who will take the two or three most valuable teaching cases and discuss them with the assigned student group before the close of the period. (*f*) There should be a full-time fellow in each clinic in actual daily charge. This fellow, a graduate student, manages the clinic and is in entire charge of the nursing and social service personnel. (*g*) Stenographers, nurses and social service clerks are a necessary part of the personnel. The proper equipment for good outpatient teaching is exactly that of the hospital, lacking only the feature of continuous care in bed. The physical plant should provide: (*a*) An adequate number of examining rooms, with adjacent dressing rooms, each equipped with the necessary examining furniture and instruments. (*b*) A small laboratory in each service. (*c*) A large laboratory of clinical pathology with adequate personnel, this laboratory to care for all types of pathologic work, including serology and the preparation of vaccines. (*d*) A metabolism laboratory. (*e*) An electrocardiograph laboratory. (*f*) Radiologic and physical therapy departments with ample provision for fluroscopy, cystography and pyleography. (*g*) A classroom available for each service. (*h*) Waiting space in each clinic, not one large common waiting room. (*i*) An accessible library. (*j*) A photographic and art department. This equipment is essential even though the teaching hospital occupies the same or an adjoining building unless the hospital laboratories and services are ample and are under full control of the outpatient services. Outpatient teaching is advantageous to the student in that he sees the beginnings of disease, not the end-results, and he learns to recognize subjective symptoms. He learns the management of patients. He develops resourcefulness. He learns to work rapidly, yet with accuracy, in history taking and in making physical examinations. He early learns the importance of forming a definite outline of management, the importance of therapeutics and the necessity of restoring the patient—the support of a family—to earning capacity at the earliest possible moment. The instructor is also benefited. Good teachers in the outpatient department will train good teachers. The head of the department, if he really appreciates his opportunity and really desires to develop younger teachers, should act as chief of his service in the outpatient department at least once each week for a given period. On his presence will depend the inspiration and stimulus of a large number of younger clinicians. His contacts with his associates are educational to a far greater degree than with an academic curriculum; his ambition is stimulated under conditions that encourage study. His clinical horizon is definitely widened, and his contacts with the preclinical branches emphasized and sustained. Opportunities for research are legion.

Teaching on Tuberculosis

The teaching of tuberculosis in medical schools can be rendered much more effective without materially increasing the strain on the present curriculum. If the professor of medicine is to be required to teach tuberculosis he must have a daily clinical contact with the disease. Every teaching hospital should provide beds for diagnostic study and temporary care of tuberculous patients. Every tuberculosis dispensary and every available sanatorium bed should be pressed into service. With such an arrangement the student could learn under the professor of medicine the diagnosis, the broader principles of treatment and the general importance of the disease in every day practice. With a two or four week's residence in a well-managed sanatorium he would have opportunity for further diagnostic training, a study of prognosis, routine management, social significance and special forms of treatment. If necessary to make room for this two week's

residence in a sanatorium, I would suggest that certain hours be cut from some of the specialties or that the students be taken from the bleachers of the surgical amphitheater. The medical student should be taught to supplement "intuitive sagacity" and as far as possible eliminate empiricism by the acquisition of knowledge through the fundamental methods of physical examination. The application of these methods is ideally accomplished through the clinical study of tuberculosis. Medical schools and the established agencies for the study and the control of tuberculosis should be in closer cooperation in order that all accumulated knowledge and all available materials may be placed in the path of the medical student. Conscientious cooperation would forward the interests of both the agencies and the medical schools, through coordinated effort and the consequent discharge of mutual obligations to society. This plan would soon render inexcusable the charge of inefficiency and lack of knowledge on the part of the family physician with reference to tuberculosis.—MOORMAN, L. J., *Southern M. J.* 21:116 (Feb.) 1928.

Psychology in Medical Education

Psychology is primarily a pure science. It is analogous to physiology, and, like the latter, may be regarded as a basic medical subject. In the study of behavior, psychology somewhat overlaps the field of physiology, just as physiology overlaps the field of biochemistry; but while physiology is primarily concerned with the functions of organs, behavior psychology deals more especially with the function of the total organism, that is to say, with the responses of the total organism to environmental situations. Abnormal psychology is that branch of psychology which treats of deviations from the normal in consciousness and in behavior. It, therefore, includes a study of both the subnormal and supernormal in all psychologic traits. Some of these deviations from the average are due to disease, while others are purely constitutional. Abnormal psychology includes the study of both types of deviation. The part of abnormal psychology which limits itself to a study of deviations due to disease is called psychopathology. Abnormal psychology is thus broader than psychopathology. It treats of all sorts of idiosyncrasies, whether symptoms of disease or merely individual peculiarities. Abnormal psychology is also primarily a pure science. Psychiatry on the other hand, is a medical specialty, somewhat analogous to other medical specialties, like dermatology and ophthalmology. It is thus an applied science, or an art whose final object is the diagnosis and treatment of mental patients. It is broader than psychology. In the teaching of medical students the psychiatrist's task corresponds to that of the medical clinician. Of course the psychologist may, in the presentation of his psychology and abnormal psychology, indicate some applications, and illustrate his material with practical examples, just as the physiologist and pathologist generally do. But the psychologist has no right to practice in the medical sense. He is merely a specialist in a particular field of science, and practice requires a much broader training in many other sciences besides psychology, and in the art of handling patients. He may, however, be consulted for advice on special problems, just as the physiologist and biochemist are frequently consulted. The general medical student needs training in the basic subjects of psychology and abnormal psychology, while the student specializing in psychiatry should have a more intensive training in these subjects. The psychologic needs of the general medical student and of the student of psychiatry must, however, be considered separately. The course in general psychology should be connected as closely as possible with the student's work in anatomy and physiology. After presenting the above point of view on the mind-body relation, the course might continue with a discussion of the stimulus-response hypothesis and the mechanism of behavior, including receptors, adjustors and effectors. In this connection, considerable time might be spent on the central nervous system, in order to give the student a sound working hypothesis regarding neurone relationships and neural activity, which will assist in a better understanding of the phenomena of behavior and conscious-

ness. Then there might follow a discussion of such topics as instinct, habit, initiation and suggestion, perception, association, memory and other forms of ideation, feeling, emotion and the nature and development of temperament, character and personality. The time spent on perception might very well be reduced to a minimum of perhaps one or two lectures, and proportionately more time devoted to instinct, emotion, the motivation of behavior, and the various dynamic aspects of the personality. Considerable time should be given to habit and the process of habit-formation and learning. There should also be some discussion of the nature of intelligence and validity and significance of so-called "intelligence tests." The course in abnormal psychology should deal with the abnormalities of the chief mental traits and functions and their explanation. It should include especially such topics as illusion, hallucination, mental blindness, aphasia, amnesia, delusion, obsession, phobias and other aberrations of instinct and emotion, abnormalities of feeling and temperament, and disorders of personality. It should also deal with such topics as dissociation, mental conflict, repression and its consequences, and perhaps the psychology of dreams and hypnosis. There should, of course, be some discussion of the meaning of the abnormal and the relation of abnormal to normal mental life and behavior. The course might conclude with a consideration of the application of psychology and abnormal psychology in the understanding of various behavior problems of childhood and adult life. Discussion of disease entities or symptom complexes, their etiology, classification, and treatment should be left to the psychiatrist. In addition to the description of the various mental abnormalities there should be in each case a discussion of some of the common explanatory hypotheses or theories, such as neurologic explanations, endocrinologic and other physiologic explanations, and psycho-analytic explanations. This would involve also some discussion of the so-called unconscious, or subconscious mind. The main object of the courses in psychology and abnormal psychology for the student of general medicine is to give him a psychologic point of view, an understanding of some of the fundamental problems, and some knowledge of the fundamental problems, and some knowledge of well-established psychologic facts and principles. If this object is attained, he will approach his patient as a psychobiologic unit, and as a total personality. He will not only treat patients rather than symptoms, but he will also have a better understanding of the significance of the symptoms in relation to the personality as a whole, and of the role of psychogenetic factors in their etiology. The student who proposes to specialize in psychiatry should, of course, have more intensive training in psychology and abnormal psychology. This training should include courses in experimental psychology, the technic of mental testing and other forms of mental examination. Such courses could be either undergraduate or graduate courses, according to the policy of the medical school with reference to specialization before or after graduation.—BRIDGES, J. W.: *Canadian M. Association J.* 18: 382 (April) 1928.

Psychiatry and Its Relation to Teaching of Medicine

The relation of psychiatry to the teaching of medicine, as shown through a possible job analysis, is discussed by Williams. He says: The average general practitioner has presented to him more problems of internal medicine than of mental disease (psychoses). But every cardiac case is not a gastric case —after a preliminary examination, the stomach can largely be ignored. Every gastric case does not have a cardiac involvement—the heart can be ignored. However, in every cardiac case there is an emotional reaction to the situation—sometimes more, sometimes less—the stomach may be ignored but the emotional situation cannot be. In every gastric case there is an emotional reaction to the situation—sometimes more, sometimes less—the heart may be ignored but the emotional reaction cannot be. Our clue as to what is basic, therefore, lies here. The extreme behavior of all psychotic patients is not basic; the behavior reac-

tion of the patient free of a psychosis, but ill of a physical disease is basic. Knowledge of the different types of paraphrenia or of dementia praecox is of little importance to the general practitioner. It makes little difference whether he can differentiate between dementia praecox and manic-depressive insanity; it makes considerable difference whether he has some knowledge of temper tantrums, anxieties, fears, and the common emotional reactions to be found in every patient who comes to him. It is this material from the field of psychiatry that is important to the general practitioner. But how is this to be taught? In the teaching of psychiatry at the present time the same course is pursued as has been followed in the obtaining of knowledge. I believe that the method should be reversed. The medical student will profit more if, instead of beginning instruction with the psychoses or with a demonstration of pathologic reactions exhibited by patients with psychoses, instruction is begun with the simpler emotional reactions and the development of the emotional life reconstructed for the student. There should probably be a step preliminary even to such instruction. It is man who is to be discussed; man as he actually exists, not a phantom man. But the individual as an individual, man as a man, is not so real. His man is a nonexistent, unreal man built up of odd bits of religious, ethical and moral dicta and held together by his own personal emotional reactions to experiences with men. It is thus a fictitious man, who may have little relation to man as he actually exists, that he brings to the class room to study. This matters little in most of his courses in the medical school, but it matters a good deal when it comes to the subject of psychiatry which will deal with the behavior of man; not alone the behavior of an organ but of the man as a whole; and again, not alone the total man as an isolated physical unit, but man in an environment, man in his social relationships and therefore man in his moral, ethical and, perhaps, religious relationships. These relationships can be depicted to little purpose except as regards man as he has been and is. This man must be built up for the medical student as well as for any other student and a preliminary cuorse in psychiatry may well begin in a cogent review of material from anthropology, biology, physiology, comparative anatomy and other basic sciences, until the student has before him the precise man who is now to develop an intellectual and emotional life, establish social relationships and build codes of morals, ethics and religions. Emphasis should be on the more, so-called "normal" types and the relation of these to social situations, social concepts, laws, morals, ethics, to medicine itself and to students themselves. With further elaboration the field of the neuroses and functional psychoses can be entered although little more than an orientation should be attempted. The material up to this point is material that every physician must deal with daily; beyond this point the material becomes special. A course of this kind is basic to all medical training and should be given in the first or second year of the medical course.—WILLIAMS, F. E.: *Am. J. Psychiatry*, 7:697 (March) 1928.

Dermatologic Education

The pedagogic presentation of the subject of dermatology has been distinctly modified by newer methods of treatment and by new instruments of great therapeutic value. The treatment of patients with syphilis by synthetic chemicals suggests the necessity of a basic understanding of organic chemistry. The extraordinary place which the roentgen ray, radium and other radio-active substances have in the present therapeutic armamentarium presupposes a considerable knowledge of the physical chemistry of these agents for their intelligent use. Concerning the question of syphiology, the periphery of the knowledge concerning the natural history of this disease has shown an enormous advance not paralleled in any other field of medicine. The discovery of the spirochete and the application of biochemistry to the serodiagnosis of the disease and of synthetic chemistry in the treatment have increased tremendously the necessity for a workable knowledge in the fundamental subjects concerned with these modern con-

cepts of the disease. The student of syphilology, therefore, whether he is an undergraduate or graduate or a practicing syphilologist, should have a substantial background of training in internal medicine in order to appreciate properly and to interpret the morbid processes of syphilitic disease. The ideal approach for the presentation of dermatology and syphilology from the pedagogic aspect should be with a perspective from the field of internal medicine, with which both subjects are so closely alined and related. From the teacher's standpoint, a lack of a broad foundation in internal medicine is an overwhelming handicap to the intelligent interpretation of cutaneous disease.—WILE, U. J.: *Arch. Dermat. and Syph.*, 17: 454 (April) 1928.

Teaching of Dermatology and Syphilology to Medical Undergraduate

A specialty should be taught to medical students with the intellectual foot forward; that is, as a form of medical culture. They should learn to examine and to see, to describe and to reason from observation within a particular functional or structural field. Thus conceived, the teaching of a specialty is part and parcel of the general medical education of the student—a training in method and approach much more than in mere fact. It is proper for teachers, and, I believe, in harmony with the purposes of medical teaching for the undergraduate, to look on the intellectual discipline of dermatology and syphiology as a developer of medical right thinking quite as much as a parcel of established knowledge. In many ways it is more important that the student have the examination of the stripped patient and the complete inspection of the body surface so ingrained into his medical conscience that he can never feel right without it, than that he should learn a prescription for acne or a treatment for eczema. The next obligation to the medical undergraduate is to teach dermatology as medicine and not as specialism. He serves his students and his specialty best when he can appear before them as a medical man conversant with, though not practicing, the most important aspects of all the medicine and surgery that borders on his field. In fact, he must be an internist, a neurologist and a surgeon, as well as a dermatologist in point of view, acutely aware of everything that contributes to the entire well-being of the patient, even though he enters with a cutaneous complaint. He must not be merely a "skin man," an electrician, a pharmacist or a dispenser of shots. I believe that it is much more important for the student to learn, for example, to envisage all inflammatory processes in the skin as having a fundamental group of dermal reaction signs, the language of the skin in all forms of inflammation. I prefer to teach them to look for analyzable groups of predisposing and exciting causes, whether external or internal, rather than to confuse them with a schism in the terminology. I do not feel it necessary or desirable to include laboratory instruction in microscopic changes in the skin in the work of undergraduates. Students who have been well trained in pathologic principles can visualize well, on verbal description, what is going on in the majority of cutaneous lesions. They should, in fact, be obliged to visualize it in terms of their general knowledge and not of any special, pathologic background for the latter plan insularizes the knowledge and pigeon-holes it for the undergraduate. Pathologic conditions of the skin can be woven into the teaching of cutaneous diagnosis, and these is no more occasion for the undergraduate to study it as such than for him to take a special laboratory course in the microscopic changes in the lung before beginning to look at roentgenograms of the chest in roentgenology. For the undergraduate, then, let there be systematic drill in the diagnosis of the acute and the infectious dermatologic conditions—the acute dermatitides, the pyogenic dermatoses, toxic and drug eruptions, animal parasites, acute exanthemas, the commoner mycoses, syphilis and tuberculosis. Moreover, whenever a cutaneous landmark points toward a significant medical condition, the undergraduate should be thoroughly initiated. He should know the meaning of scars, the objective differentiation of ulcers, the analysis of

itching and the interpretation of a generalized dermatitis or a pigmentary syndrome. In treatment, the undergraduate should be taught to deal as a first-aid with the common diseases, but he should not be given the impression that because an ailment is common, he necessarily knows as much about it as a specialist. Similar principles apply to the teaching of syphilology. I do not think a larger allotment of time is needed in the curriculum than many now possess. I have even thought I could do with less than I have, given an adequate textbook and outline, and the maximum economy and intensity in teaching method and impress. With from sixty to eighty teaching hours available, I would put my major emphasis on the phases of syphilis which I have discussed, for in so doing I would perform my duty as a teacher of medicine by an objective method, and I would cover a wide range of differential dermatology incident to the accurate diagnosis of syphilis. During the past year my colleagues and I have devoted ourselves to a combined course, mixing dermatology and syphilology as the method of teaching and interrelations of the material required. The course begins with training in the objective identification of dermatologic lesions. By February, the teaching of dermatology is completed, and syphilis becomes the chief interest, with a double allotment of time. I have thought of reversing the order next year, and training the student entirely by means of a patient with syphilis, fully examined and studied. In the last twelve hours of the course I would then try to present, in massive form, clinical summaries, using from six to eight patients at a session, of the chief dermatologic conditions with which the practitioner should be conversant. Didactic presentation today is for the printed page and the memeographed sheet. I would tell the student little or nothing about anything, and lead him instead, by skillful questioning and discussion, to create his own fund of information out of what lies before him for observation, cemented by inductive reasoning based on his own past knowledge, medical and personal. —STOKES, J. H.: *Arch. Dermat. & Syph.* 17: 467 (April) 1928.

Book Reviews

A Text-Book of Clinical Neurology

By Israel S. Wechsler, M.D., Assistant Professor of Clinical Neurology, Columbia University. Cloth. Price, $7. Pp. 725, with 127 illustrations. Philadelphia: W. B. Saunders Company, 1927.

The author has introduced a book on clinical neurology that is different. The difference lies in the approach, arrangement, illustrations and the ease in which the reading matter is written. Although Wechsler has divided the contents of his book into five parts, namely, Method of Examination, The Spinal Cord, The Peripheral Nerves, The Brain and The Neuroses he has not lost sight of the various connecting links between one group and the other. In the method of examination, every detailed description of an excellent accepted method is given with a complete interpretation of signs and symptoms. In Part 2 the spinal cord is taken up. All its pathologic states are discussed separately, with each entity described from an anatomical, physiological, pathological and symptomatological standpoint. Because of this arrangement, it is rather easy for the student to appreciate the numerous symptoms because of involvement of certain areas instead of having to remember many symptoms without appreciating the mechanism of the production of these symptoms. In other words, functions are fairly well localized.

Part 3 on the peripheral nerves includes all the clinical entities. Here briefness is the only objection. Part 4 includes all the pathologic states of the brain written very plainly, definitely and easy to understand. The neuroses are discussed in Part 5, while written superficially, it is to the point.

Treatment is given considerable and very necessary attention. The author describes in detail the methods that are beneficial and most modern. Personal experience is discussed and the experiences of others are also stated. There are numerous illustrations consisting of

anatomic drawings and pathologic specimens. This book is an excellent contribution to clinical neurology and can be highly recommended as a text-book for student and practitioner.

Aids to Biochemistry

By E. Ashley Cooper and S. D. Nicholas. William Wood and Company, New York, 1927. Price, $1.50.

As the authors state in the preface, this compend is not to take the place of a textbook but is a handbook for reference. It gives the information desired in a very concise and comprehensive manner and covers the subject thoroughly. The book will no doubt be appreciated by the medical student.

Nutrition and Diet in Health and Disease

By James C. McLester, M.D., Professor of Medicine, University of Alabama, Birmingham, Alabama. W. B. Saunders Company, Philadelphia, 1927.

The author in his preface states, "It has been necessary for the sake of clearness to include much that belongs to the basic sciences. . ." This is a particularly good move in a book on dietetics and requires no apology. The book is divided into three parts. The first part deals with nutrition in health and contains excellent chapters on metabolism, digestion and absorption. The author gives in a concise manner the usual data regarding fuel requirements and the proper balance to maintain in the various food factors. The chapters dealing with food products present accurate information for easy reference. The chapters on diet in health gives data regarding what the author calls "The Normal Diet." This section contains a chapter by Marriott on "The Feeding of Infants," which is a distinct addition to the book and will make it of decided value to the practitioner of medicine who is called upon to deal with infant feeding.

Part two of the book deals with nutrition in disease and the author discusses under this heading the deficiency diseases, diabetic mellitus, gout, obesity and leanness, anaphylaxis and food poisoning. He also discusses diseases of the various systems. It is particularly interesting at this point to read chapters on diet in disease written by a clinician who does not dash posthaste into the dietary treatment of disease. A short and illuminating clinical description of the condition precedes the discussion of the dietary treatment. This adds greatly to the value of these chapters. There is a chapter by Brooks on "The Feeding of Surgical Patients," which is very brief and so general in its observations that it leaves one wondering why it was included in the book.

Part 3 deals with tables and charts of food values and includes special methods of feeding such as gavage, nasal feeding, duodenal feeding and nutrient enemas.

The author does not leave one with the impression that dietary measures occupy an unduly important position in the treatment of disease, but his clinical experience has tempered his dietary enthusiasm to the point where diet is given its proper place in the scientific treatment of disease. The book would make a valuable addition to any library. It is not filled with extravagant claims for various dietary regimes and is moderate in language and well indexed for ready reference.

A Synopsis of Physiology

By A. Rendle Short, M. D., B. S., B. Sc., F.R.C.S. and C. I. Ham, M. B., B. Ch., M.R.Q.S., L.R.C.P., illustrated with diagrams, some of which are colored. New York. William Wood & Company, 1927.

This is the best book of this nature that is in publication at the present time. It is a complete and quite an up-to-date outline, although it omits some of the outstanding developments in physiology during the last three years. It is more complete than the usual compend, it being comparable to a complete outline of a series of lectures that a physiologist might give to a group of medical students. The book certainly

will not stimulate thought and does not teach anything of the philosophy of physiology. This is granted by the authors when they state that it "will be necessary for the beginner to consult also an ordinary textbook of physiology." The book would be of definite value to those medical students who find that it is difficult for them to organize the subject matter of the lectures they attend in physiology. It would also help students to review for state board examinations provided they do not possess a well organized series of lecture notes.

The Science and Practice of Surgery

Volume I: General Surgery. Volume II: Regional Surgery. By W. H. C. Romanis, M.A., M.B., M.Ch., Senior Surgeon in Charge of Out-Patients, St. Thomas's Hospital, and Philip H. Mitchiner, M.D., M.S., F.R.C.S., Surgeon in Charge of Out-Patients, St. Thomas's Hospital. Cloth. Price, $12 per set. Pp. 795, with 330 illustrations, and pp. 955, with 290 illustrations. New York: William Wood & Company, 1927.

A new work on general and regional surgery produced in two volumes. Volume I, consisting of 795 pages, including an index, deals with general surgery. The contents are: general surgical procedures, inflammation, infections, injuries, gangrene, tumors, injuries and diseases of the various tissues and organs, including bones and joints, deformities, amputations, the roentgen ray in diagnosis and treatment, and anesthesia. Volume II, consisting of 955 pages, including an index, takes up regional surgery. Beginning with the head it proceeds in general toward the pelvis. The brain is considered before the scalp and skull; the spine is considered before the face, mouth, jaws, tongue, eyes or nose. Except for these chapters, the arrangement is logical. The extremities are not considered at all! Whatever is said about these is to be found in Volume I. Why a separate volume for regional surgery? Infections of the hand and of the palmar space apparently have been deliberately omitted. The scope of the work is similar to that of Rose and Carless. The division into two volumes is a praiseworthy job. Textbooks are becoming too cumbersome. They are assuming encyclopedic proportions, hence are really reference works rather than texts for class work. The inclusion of after-treatment of operations is desirable. The practice of prefacing each chapter with a short account of applied surgical anatomy and physiology of the region or organ discussed is to be commended. The work is well printed and well illustrated. The subject matter in general is well arranged. Although this work possesses many good and attractive features, it is not one that will appeal to American teachers of surgery because there is in some instances considerable variance between English and American practice; as, for instance, in the use of hot and cold applications in appendicitis. Furthermore, the many omissions, which one hardly expects to find in a textbook, would seem not to give this work first place in the list of "the one" text on surgery for undergraduates in medicine —at least not for the American medical student. However, opinions may differ as to that.

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